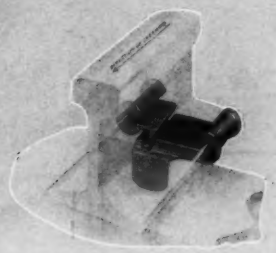
Railway Maintenance Engineer

Volume 18 CHICAGO—JUNE, 1922—NEW YORK Number 6

ON CURVES AND GRADES

There is no substitute
for
DEPENDABLE
RAIL ANTI-CREEPERS
The heavier the traffic the greater the need

THE P.&M.CO.



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(ENGLAND) LTD
31. BUDGE ROW. LONDON.

How many of your water columns are knocked down every year?

What do the repairs and maintenance—not the result of ordinary use—cost you?

Avoid this annoyance, trouble and expense by using a

POAGE Style "H" WATER COLUMN with FENNER DROP SPOUT

The three foot lateral range in the Fenner spout and the steel riser in the Poage Style H save the water column from being knocked down by the shifting of the tender.

The tender has to leave the track to knock this column down.

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THE AMERICAN VALVE & METER CO.
CINCINNATI, OHIO

RAILWAY MAINTENANCE ENGINEER
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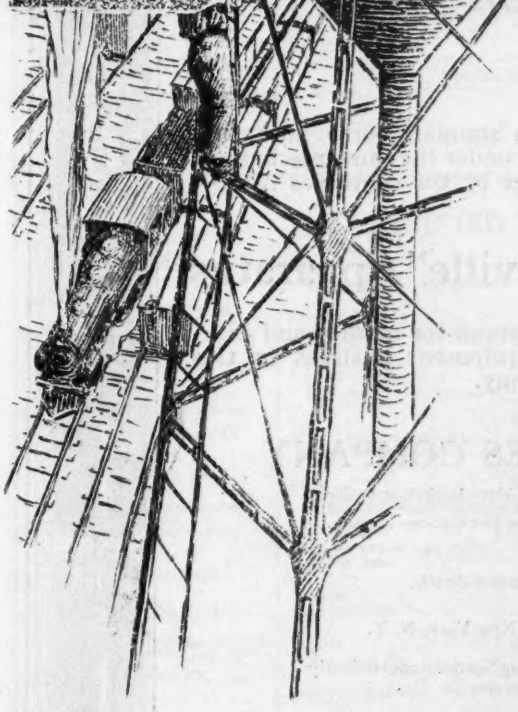

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"Airco" and "Airco—Davis-Bournonville" stand for quality and completeness in the oxyacetylene gas and equipment business in this country. Remember this when ready to buy.

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Manufacturer of Airco Oxygen—Airco Acetylene—Airco—Davis-Bournonville Welding and Cutting Apparatus and Supplies, Acetylene Generators, and Specially Designed Machines for Automatic Welding and Cutting—Nitrogen, Argon and other Airco Atmospheric Gas Products.

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Maintenance of Way Buyers' Guide

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Zinc Chloride.
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Will not freeze in any weather

DUMORITE—the new Du Pont dynamite which gives you over 1/3 more work for your dollar—is *non-freezing*.

By rigorous laboratory tests and extensive field operations we find that Dumorite can be shot successfully at any temperature. It is just as good in below-zero weather as in the summer time.

Stick for stick, Dumorite does approximately the same work as 40% dynamite, but you can buy 135 to 140 sticks of Dumorite at the same price as 100 sticks of "40%." And Dumorite is a guncotton-nitroglycerin dynamite that will not cause headache.

Dumorite is being used successfully in most kinds of explosive operations. Write our nearest branch office giving details of your particular work and let our Service Department solve the problem of fitting Dumorite to your job. Let Dumorite reduce your explosives bills for 1922.

E. I. du Pont de Nemours & Co., Inc.

Explosives Department

Wilmington, Delaware

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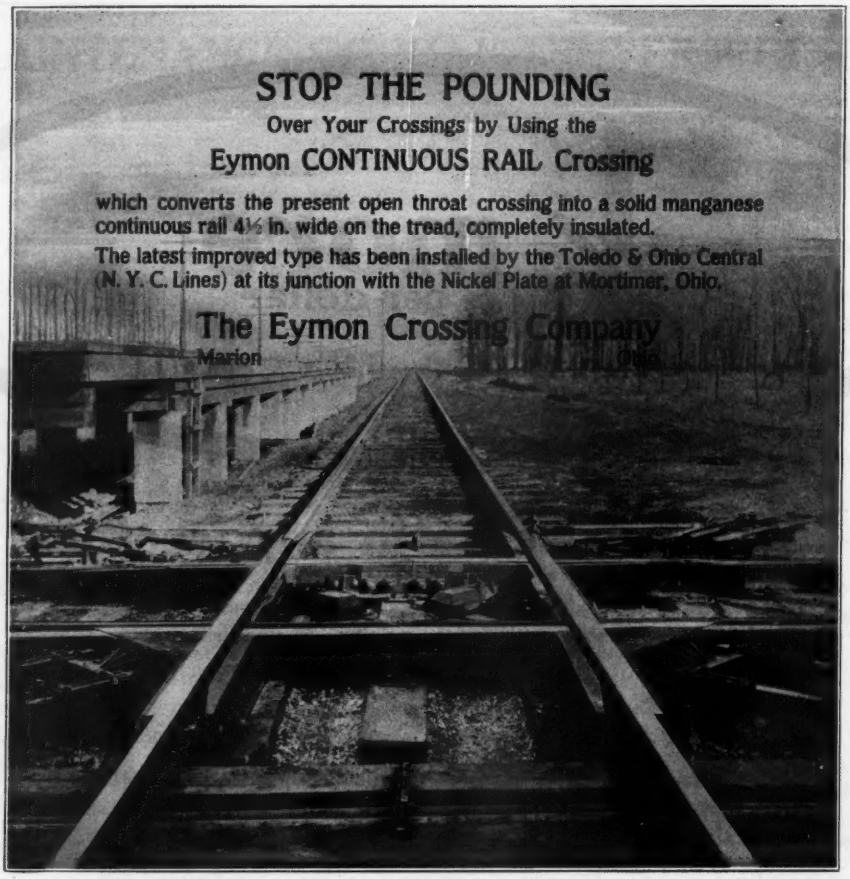
Atlantic City, N. J.

NON-HEADACHE DU PONT NON-FREEZING

DUMORITE


STOP THE POUNDING
Over Your Crossings by Using the
Eymon CONTINUOUS RAIL Crossing
which converts the present open throat crossing into a solid manganese continuous rail 4½ in. wide on the tread, completely insulated.
The latest improved type has been installed by the Toledo & Ohio Central (N. Y. C. Lines) at its junction with the Nickel Plate at Mortimer, Ohio.
The Eymon Crossing Company
Marion

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CROSSINGS

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STATION PLATFORMS

Write for Particulars and Booklets

HEADLEY GOOD ROADS CO.

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SWITCHES FROGS CROSSINGS SPECIAL TRACKWORK

of all Constructions

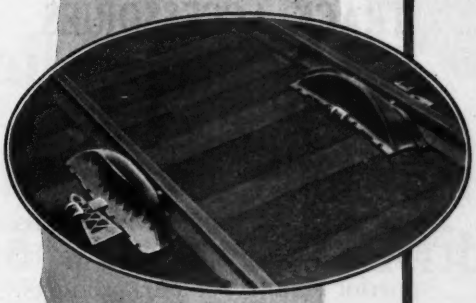
Originators of

MANGANESE STEEL TRACKWORK

WM. WHARTON JR. & CO., Inc.

EASTON, PA.

Let's Go - Be Sure You Have Reading Replacers Aboard



Being prepared is half the job—and the wrecking master knows it—that's why he always makes sure he has

READING REPLACERS

Engine or car off the track—Reading Replacers are just the thing for such emergencies, especially when every minute counts. They are designed along practical lines and will rerail any weight of equipment on rails from 4" to 8" high. Reading Replacers make light of heavy work. They cannot slip or turn over under the weight of car or engine.

Reading Replacers should be in every tool car—on switch engines and in cabooses.

American Chain Company
Incorporated
Reading Specialties Division
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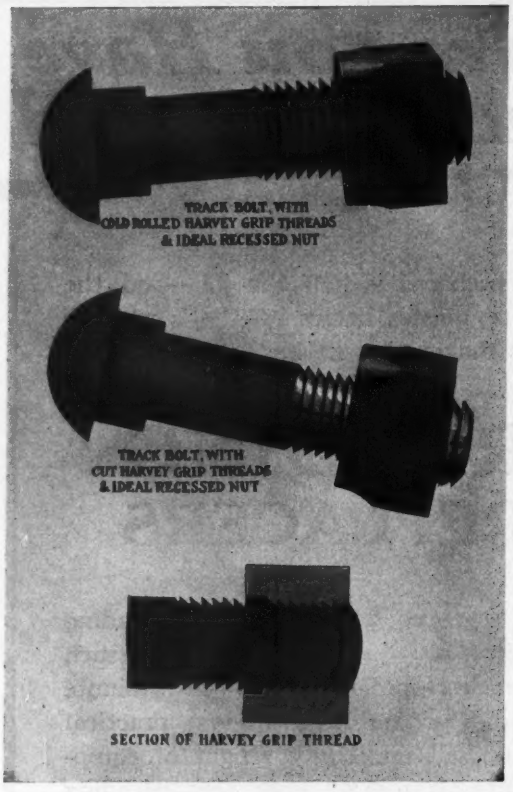
TRACK BOLT, WITH
COLD ROLLED HARVEY GRIP THREADS
& IDEAL RECESSED NUT
TRACK BOLT, WITH
CUT HARVEY GRIP THREADS
& IDEAL RECESSED NUT
SECTION OF HARVEY GRIP THREAD

TRADE MARK
Mayari

Steel Heat-Treated Track Bolts

with Harvey Grip Threads and Ideal Recessed Nuts

Form a complete fastening in themselves, making unnecessary the use of any other nut-locking device.

Mayari Steel

Track Bolts are uniformly heat-treated and are guaranteed to test not less than—

Elastic Limit 85,000 lbs. per sq. in.
Elongation in 2 ins. - - 15 per cent
Reduction of Area - - 40 per cent

BETHLEHEM STEEL COMPANY
General Offices: BETHLEHEM, PA.

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New York	Baltimore	Pittsburgh	Chicago
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SOLE EXPORTER OF OUR COMMERCIAL PRODUCTS CONSTECO CONSOLIDATED STEEL CORPORATION 25 BROADWAY, NEW YORK, U.S.A.

INLAND STEEL

Standard Section Tee Rails
and
TRACK ACCESSORIES

Splice Bars—Heat Treated
Tie Plates
Track Bolts—Heat Treated
Track Spikes

Inland control from raw materials through final inspection insures the superior quality of our products.

INLAND STEEL COMPANY
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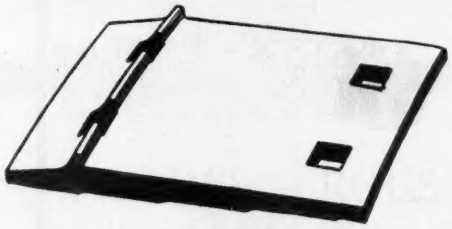
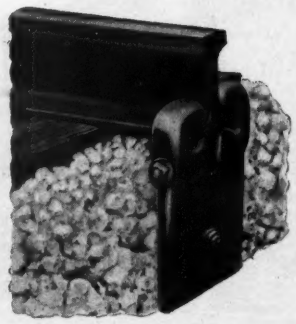


The Lundie Tie Plate

Will give rail and wheels longer life.
Will hold gauge and not injure a single fibre of the tie.
Will not rattle.



The Lundie Duplex Rail Anchor

Requires only one anchor per rail.

Will hold in both directions.

The Lundie Engineering Corporation
920 Broadway, New York
166 West Jackson Boulevard, Chicago

Rail Bonding with Imperial Pneumatic Tie Tamper Outfits

Above—A four tool Imperial Tie Tamper Compressor operating four "Little David" Bonding Drills

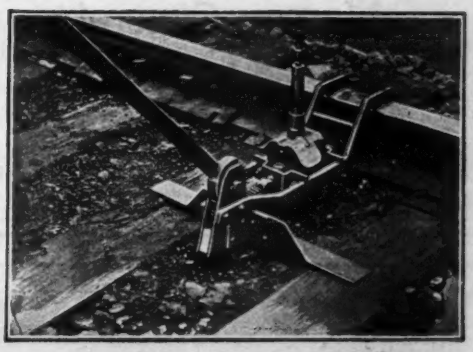
Saves time, labor and drill bits

A rail bonding outfit using a Tie Tamper Compressor Car and four (4) "Little David" Bonding Drills recently drilled 2,094 holes in 7½ hours, covering a distance of a little over three miles.

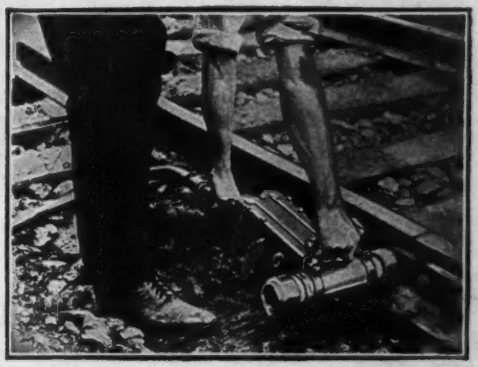
Seventy (70) holes were drilled per hour per drill. 324 holes were drilled with one drill bit. Compare these records with old methods.

Imperial Tie Tamper Compressor Cars are handy portable units for supplying air power anywhere along the line. They not only furnish power for operating tie tampers and bonding drills but are used to supply air for many other labor saving tools.

Ask for further details on all the uses.



Close-up view of a No. 5 "Little David" rail bonding drill. This is a lightweight but rugged air tool



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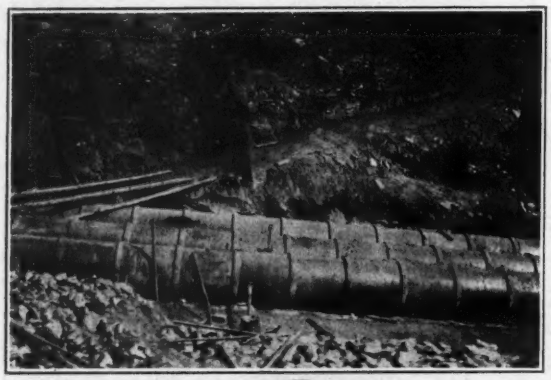

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VI. Economics of Roadway.
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VIII. Essential Elements in Maintenance of Track.
IX. A Program of Maintenance of Way and Track Work.
X. The Track Obstruction.
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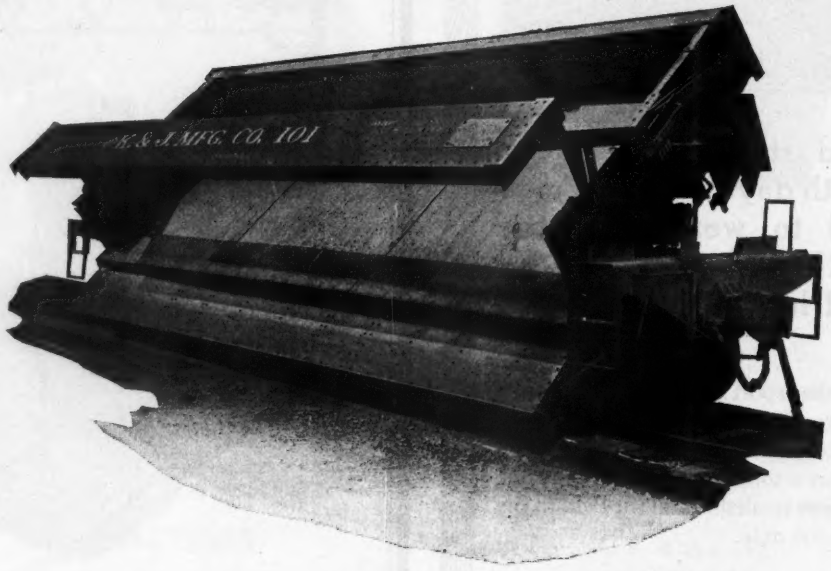

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Railway Maintenance Engineer

Vol. 18 June, 1922 Number 6

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How employees can be protected from malaria?

What a bridge supervisor should do in times of high water?

How the operating department can help maintenance work?

The strength of timbers used for ties?

If a tie should be tamped for its entire length?

Answers to these and other practical questions will be found elsewhere in this issue.

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WE GUARANTEE, that of this issue, 6,650 copies were printed; that 5,732 of these copies were mailed to regular paid subscribers, 70 were mailed to advertisers, 28 were mailed to employees and correspondents, and 820 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 41,850, an average of 6,975 copies a month.

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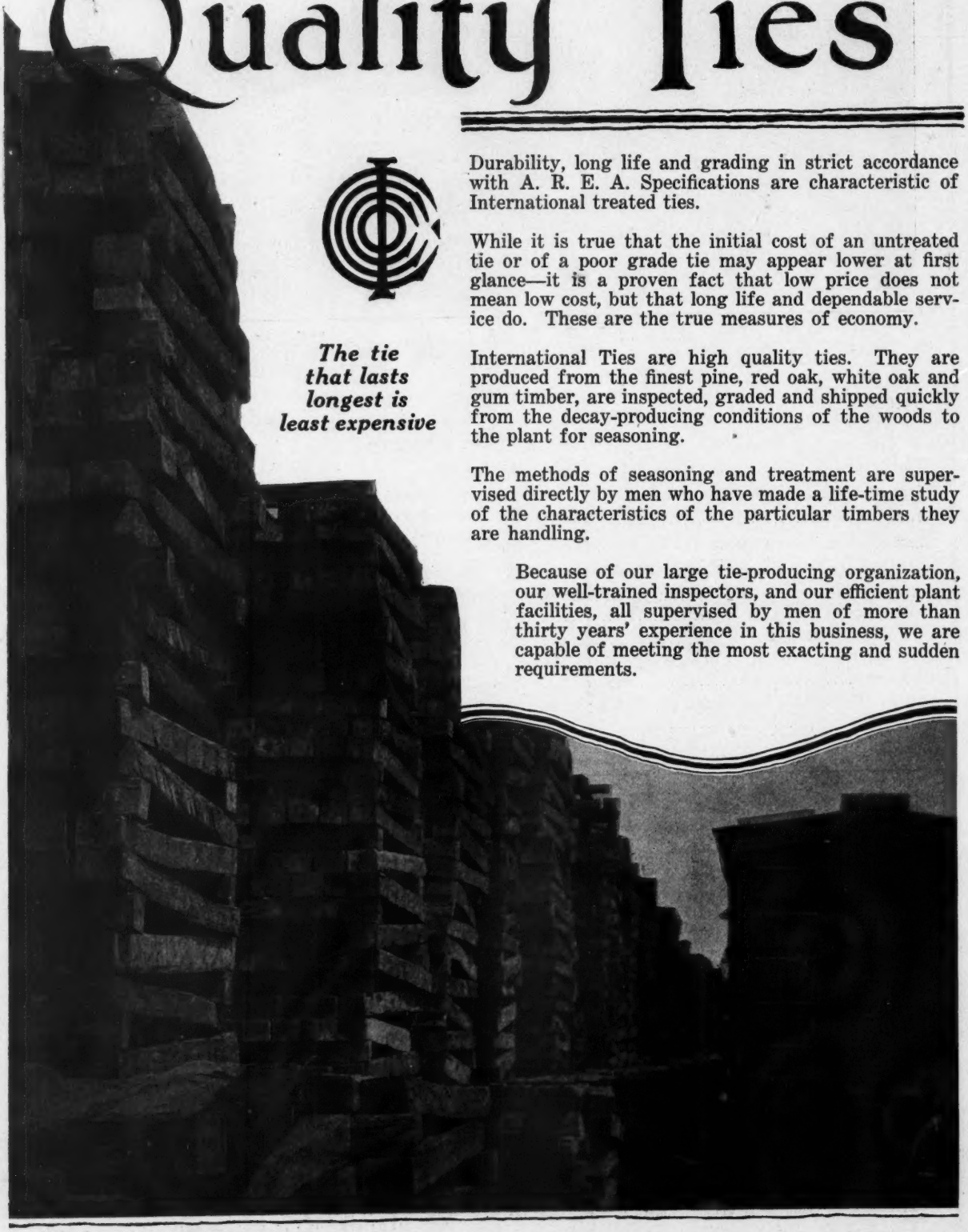
Quality Ties



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Railway Maintenance Engineer

A delay of an hour to a gang of 50 men is equivalent to the loss of more than six men from the gang. No supervising officer would permit six men in a gang to occupy their time with unproductive work, yet this loss is occurring to an even greater extent in many gangs throughout the country today because of the interference with trains. There are many maintenance operations which can be conducted without interference from traffic, but there are others such as the laying of rail and ballasting which require the use of the track. If such operations must be performed in such a way that trains may be allowed to pass without delay, the output of work is reduced accordingly. In many instances little or no relief is practicable, in others partial or total relief is feasible if proper arrangements are made. No single influence adds more to the cost of maintenance work of the character referred to above than traffic interference. Maintenance officers who will analyze the operation of their gangs and make detailed studies of the time lost from this cause will be surprised at the amount of this loss.

Figure the Cost of Delays

One indisputable evidence of the return to normal economic conditions in this country is the renewed attention to bridge construction, particularly of the enormous structures spanning important rivers. Within the last month attention has been directed to two great bridges on which work will be undertaken shortly, a crossing of the Hudson river for the New York Central just below Albany, and a new bridge across the Niagara gorge for the Michigan Central. These two structures alone will involve the fabrication of 30,000 tons of structural steel. It is well to keep in mind also the fact that some important bridge work has been in progress and includes such large structures as the Cincinnati Southern bridge across the Ohio, the superstructure of which was entirely replaced and the new cantilever bridge across the St. John river in New Brunswick for the Canadian Pacific, having a span of 450 ft. The reconstruction of the Galveston causeway, which included the construction of 69-60-ft. arch spans, is now virtually finished. While not directly relating to the railroads, the work now in progress on the great suspension bridge across the Delaware river at Philadelphia will be of interest to all men who are concerned with bridge work.

Important Bridge Work in Progress

Few roads have given any thought to the relation between the efficiency of the maintenance of way forces and the conditions under which they live. In this respect they have lagged behind many other large employers of labor. The need for more attention to this phase of employment is particularly urgent among maintenance of way employees because many of them are required to live away from home in cars or other temporary quarters which are seldom satisfactory. No disease makes more serious inroads on these forces than malaria, nor is any more prevalent. While its attacks are most common in Arkansas, Louisiana and adjacent states in the southwest, where malarial mosquito abounds, they extend over a relatively wide area at certain seasons of the year. In striking contrast with a general indifference to this condition, the St. Louis Southwestern has inaugurated an aggressive campaign to stamp out malaria among its forces and the inhabitants along its lines. As is described in another column, the effect of this campaign on the efficiency of its forces is indicated strikingly by the fact that the number of man hours worked by bridge and building employees per hospital case increased from 5,000 prior to the installation of protective measures in 1916 to 32,000 after they had become operative in 1920. While this result has been brought about through a highly organized campaign under the direction of a trained sanitary engineer, the measures which were instituted are simple enough to be applied anywhere. No supervisor or foreman should permit his men to ignore such simple protective measures as the screening of cars, the spraying of adjacent pools of stagnant water with oil, etc.

Good Health Promotes Efficiency

At a time like the present when rivers strain their banks, when barrow pits are lakes and reports of dislodged bridges leave the impression that the immediate concern in water service is one of getting rid of water, it may seem inappropriate to raise the question of saving water. But when it is considered that always between the flood and the hydrant, the inundated areas and the engine boiler, there is the pump requiring, for all practical purposes, the same amount of time and fuel during high water as in low water and when it is considered also that by far the greater portion of the supplies provided for railway use are obtained from sources which are comparatively unaffected by seasonal changes, the subject takes on a different aspect. Does it pay to save water? This is a question which, while invariably inviting an affirmative answer, is too often found receiving consideration only during those periods when sources of supply through mismanagement or other causes are suddenly found to have become depleted, when flurried efforts are directed to the end of making the little bit of water left last longer. Except at such times the tendency is all too frequently one of giving attention only to maintaining an adequate supply or, in the case of treated water, of maintaining an accepted standard of quality. In view of this, much interest attaches itself to the results of a campaign conducted by a western railroad against water waste. Operating on the basis that every drop of water allowed to leak away from the distribution system is so much money wasted, this road has directed its attention for seven years to this problem. The results have been remarkable. At one station alone constant inspection has effected an annual reduction in excess of $5,000 over the cost of water for the year preceding the campaign, although the business at that point had increased at least 100 per cent. A particularly noticeable reduction was made in the consumption in one of the general office buildings and, of 14 of the largest city water stations, only three have shown an increased assumption of water over the year preceding the inauguration of the campaign,

Does It Pay to Save Water?

although the gross tonnage has increased 24 per cent during the period. As a result of the seven years' campaign, in fact, it is reported that a saving of $500,000 has been effected. Such results not only suggest the advisability of similar programs on other roads, but challenge other water supply men to show what can be accomplished in their own jurisdiction. It is entirely plausible that the results on one road may not compare with those on another, but it is only reasonable to conclude from the results which have been attained that the question of water waste deserves much more attention than it ordinarily receives.

THE ACCIDENT PROBLEM AT HIGHWAY CROSSINGS

IN the four years from 1917 to 1920 inclusive, according to statistics compiled by the Interstate Commerce Commission, 26,536 persons were killed or injured in railway grade crossing accidents in the United States. In approximately 60 per cent of these casualties automobiles were involved, 4,718 persons being killed and 13,644 being injured in accidents of this class. In 1920 alone 1,273 persons were killed and 3,977 injured in automobile grade crossing accidents. A particularly disquieting phase of this problem is the fact that grade crossing accidents are increasing rapidly at a time when practically every other class of railway accidents is decreasing. This indicates the growing hazard of the highway grade crossing with the great increase in the number of vehicles, and particularly of automobiles using the public roads.

Even the most casual study of this problem will convince one that a large part of these accidents are due solely to the carelessness of the driver of the vehicle. Indeed no small number result from automobiles running into the sides of trains. The drivers of those cars deserve little sympathy. However, much as the railways may criticize the recklessness of the public, they are faced with the fact that the human being, on the highway as well as in railway service and elsewhere, is careless and thoughtless or inclined to take a chance. Without condoning this attitude in the least, the fact that this is true places a responsibility on the roads and on those responsible for the construction and maintenance of these grade crossing which did not exist to the same degree a few years ago when the highways were used less frequently, and then by slower traveling vehicles.

The rapid increase in highway traffic during the last few years, and particularly of automobile traffic, has made necessary the better construction and the more complete protection of crossings. Maintenance officers should examine each grade crossing to determine whether its alinement, grade, width and general condition meet the requirements of modern traffic. The elimination of trees or other obstructions to an adequate view of approaching trains, the installation of suitable warning signs at some distance from the crossing as well as at the crossing itself, and similar precautions are of increasing importance. In these and other ways, the maintenance of way department can aid in reducing the heavy toll of human life.

A CONSTRUCTIVE SERVICE

It is scarcely more than ninety years ago that the first railway on this continent came into being. Within the memory of men still living this industry has grown from nothing to a system of more than a quarter million miles of lines, traversing every state and province. It gives employment to nearly two million men and ranks second only to agriculture in the magnitude of its operations. Its prosperity is inseparably linked with that of our nation, for commerce cannot go forward unless the railways are prepared to move it. Railway employees are engaged in a necessary public service. The roads of which they are a part lead the world in efficiency and in economy of operation. Truly this is a work of which they may well be proud, for they are contributing to the welfare of mankind.

CONTRACTING MAINTENANCE WORK

THE LABOR BOARD has handed down no more important decision than that which appeared on May 9 relative to the contracting of railway work. While this decision refers to the handling of car repairs on the Indiana Harbor Belt, and while the Board states specifically that decisions on other cases now before it will be based on the facts in each particular instance, it establishes certain principles which are of direct concern to maintenance of way men because of the fact that several roads have contracted certain of their roadway maintenance operations. While it has been said that this decision forbids contracting, this is not an entirely accurate statement. What the Labor Board did rule was that the employees of the contractor come under the jurisdiction of the Board and are therefore subject to its wage rates and working conditions, which removes one of the principal advantages of contracting at present. It is significant that this decision was unanimous, the railway as well as the labor representatives on the Board supporting it.

That a wide discrepancy has existed between the rates which the railways are required to pay and those for which they can secure many classes of maintenance men requires no argument. This has constituted an unnecessary transportation tax on the shipping and traveling public, for which the Labor Board must assume responsibility. However, many railway men have contended that even though the Board has permitted this condition to develop, the roads should not attempt to reduce wages by indirect means,

The contracting of an occasional unit of engineering and maintenance work is an established practice of long standing which the Board recognized and which is not affected by this decision. There is also much work of a seasonal character which can possibly be handled to advantage by contract and which has been so done successfully by a few roads for several years. However, the practice of introducing an intermediate party in the conduct of routine maintenance of way operations, such as section work, is of questionable advantage from the standpoint of the railways. These operations are so intimately connected with the safety of train movement that many maintenance men feel that the most direct control of them is necessary and the injection of a third party with interests foreign to those of the railways adds a hazard. The solution of the problem of reducing the cost of routine maintenance work does not lie in such forms of contracting, but in the education of the Labor Board to the folly of attempting to fix uniform rates of pay of employees over wide areas without the possibility of revising them to meet local conditions. This is particularly pertinent now when the danger of a shortage of labor at even the existing rates is appearing in some quarters.

Letters to the Editor

USE OF CREOSOTED TIMBER ON OPEN DECK STEEL BRIDGES NOT A FIRE HAZARD

Nashville, Tenn.

To the Editor:

I have read with much interest the article in the May issue of the *Railway Maintenance Engineer* entitled "Are Many Creosoted Timber Structures Destroyed by Fire?" I must take issue with those railway men referred to in the article who do not favor the use of creosoted timber on open deck steel bridges. Wherever it has been possible for us to do so without affecting the clearance, we have installed ballasted decks on all steel bridges, except draw spans, building a creosoted timber trough to carry the ballast. In some instances this construction has been applied on spans as long as 210 ft. This practice was begun about 13 years ago.

On through bridges where the overhead span would not permit the necessary raise of the track, we have used an open deck of creosoted ties fastened directly to the steel stringers. In only one instance have we had any fires in them, although we have a considerable amount of this class of floor. In the single case referred to, the fire originated in decayed sap wood on an untreated plank footway built in the center of the track for the use of the watchmen on a drawbridge and 15 ties were damaged, although all of them are still in place. The fire was put out by watchmen with water buckets, the fire extinguishers proving ineffective on account of the high wind. We make it a practice to coat the top of all creosoted bridge ties thoroughly with sand as soon as they are put in the track, and as long as the creosote spews out of the timber during hot weather, we continue to apply sand. The sand very shortly is ground into the timber or incorporated into the coating of creosote in such a manner as to render it noninflammable.

In applying newly creosoted timber to ballast decks, we are frequently compelled to pass trains over the work before the ballast is applied. Fires are prevented in these instances by sprinkling the surface of the newly applied timber with sand. It is possible that this method of protection has not been brought to the attention of those who have found the use of creosoted timber in open decks objectionable from the standpoint of the fire hazard.

Hunter McDonald,
Chief Engineer, Nashville, Chattanooga & St. Louis.

THE ECONOMY OF THE NON-SPACING OF CROSSTIES

Slaton, Texas.

To The Editor:

In the paper read before the Roadmasters' Association last September by C. A. Morse, chief engineer of the Chicago, Rock Island & Pacific, and published in the *Railway Maintenance Engineer* for October, 1921, page 374, there appears the following statement: "The question before the railroads today is how to reduce their cost of operation, and at the same time keep the property from deteriorating."

This question is answered in part, I think, by the article in the September, 1921, issue, page 317, in which W. F. Rench presents data to prove the feasibility of the non-spacing of joint ties and consequently of all other ties. He also shows that the expansion in joints has been controlled better by this method and the use of rail anti-creepers than when the joints were spaced and slotted. I believe, however, that Mr. Rench's plan for the non-spacing of joint ties can be improved by providing a joint of the angle-bar type, so designed as to allow the creeping of the rail without the joints interfering in any way with the spike heads.

With a non-slotted joint, with standard tie plates on every tie and with the ties spaced approximately 18 in. center to center when laid, they will never have to be respaced or moved. Among the advantages of a joint of this type is the fact that it may be applied without removing any spikes, and that it will fill the place of a special heel joint for frogs and will also save the pulling, plugging and respiking of ties in renewing joints or relaying rail. The only work necessary in relaying rail of the same pattern is to pull one row of spikes inside, set in the new rail and connect it up. The joint will have ample support wherever it falls.

Mr. Rench estimated a saving of $1,000 per mile for labor alone in surfacing after the rail is relaid. However, he omitted the fact that the labor in making a two-inch raise to space ties in rock ballast is not nearly all of the expense involved. The difference between having 250 men, with equipment and tools, tied up and two or three gangs of 35 men each is quite an item. The delay to trains where five or six gangs are working is also quite a different problem from that where only two or three gangs are at work. The cost of the extra ballast must also be taken into account.

L. T. Wallin,
Roadmaster, Panhandle & Santa Fe.

NEW BOOKS

Proceedings of the Thirty-first Annual Convention of the American Railway Bridge and Building Association. Edited by the secretary. 268 pages, illustrated, 6 in. by 9 in. Bound in cloth and paper. Published by the Association, C. A. Lichty, Secretary, Chicago & North Western, Chicago.

The American Railway Bridge and Building Association is an organization of about 850 railway officers concerned with the construction and maintenance of railway bridges, buildings and water stations, and includes in its membership men of all ranks from general foreman to chief engineer. The present volume is a complete record of the proceedings of the annual convention held at New York on October 18 to 20, 1921, inclusive. It contains reports of eight committees on various technical subjects, together with the discussions which followed their presentation. There is also a full account of the business transactions of the society, including the opening address, etc. The matter in this volume covers such subjects as cinder pits, passenger platforms, the lining of tunnels under traffic, the organization for tunnel maintenance, pile driver equipment, the repair of water mains, the recruiting of bridge and building employees and a paper on treated timber, presented by C. M. Taylor, superintendent of timber preservation, Philadelphia & Reading, and the Central Railroad of New Jersey. The book is published on high grade paper with a high standard of printing and is well illustrated.

Foreign Railways—Japan, according to the British Board of Trade Journal, has inaugurated a program of railway expansion which calls for an expenditure of $278,000,000 for new construction and $432,500,000 for improvements during the next ten years. During the past year some 200 miles of new line were built and during the present year it is estimated that an additional 260 miles will be built. The same journal reports that privately owned railways have also increased.

Washout of the Approach Carried Away Part of the Abutment.

Safeguarding Bridges During Floods

Measures Taken to Prevent Scour and Methods of Determining Conditions While High Water Prevails

By Edwin M. Grime

Supervisor of Bridges and Buildings, Northern Pacific, Fargo, N. D.

WHEN THE season for flood conditions approaches, those in charge of bridges should take an inventory of material and equipment available for use in the emergencies which are liable to arise by reason of damage to bridges. Local conditions will determine what is likely to be needed and if not available on the local division steps should be taken to ascertain where such material as bridge timbers, piling, rip rap stone, sand bags and dynamite can be secured on short notice. Pile driving equipment and also steam shovels may be needed and should be in proper condition for immediate use.

As the water begins to rise various employees such as section and bridge foremen will start sending in reports which, in the excitement of an unusual situation, are often very much exaggerated. Therefore, the bridge supervisor should be fortified by accurate records and personal familiarity with the condition of every structure in his charge so he can quickly judge which are the points requiring close attention and what may best be done in each case.

Those structures of a more or less permanent nature with foundations resting on piling having good penetration or with masonry carried down well below the bed of the stream will give little cause for alarm as long as debris is not allowed to lodge around the piers, thereby creating a condition to cause scour. If the river bed around such piers is protected with a good bed of rip rap stone there is very little chance for scour to start. Nevertheless, it is well to see that all debris is kept on the move and no large trees or other floating objects are permitted to stop where they may form an eddy in the current and thus quickly dig into the bed of the stream.

In the case of the spring "break-up" with large sections of thick ice floating in the stream, men should be kept constantly on duty to see that the ice is not allowed to pile up at the bridges, but is kept moving through the openings as fast as it arrives. Dynamite and a competent man to handle it is usually invaluable in such cases.

If, in spite of all precautions, scouring and undermining seems to be going on it may be necessary to keep in touch with the condition of the river bed by taking soundings both above and below the structure, and then by making a plat of the river bed with reference to the bridge foundations it is possible to determine when the limits of safety are being encroached upon and at what location it is advisable to begin filling with rock or bags of sand or other material that may be available, in order to support the foundation properly.

When Soundings Should Be Taken

The method of taking the soundings will depend entirely on the local conditions. The difficulty of doing the work will increase directly with the depth and velocity of the stream and the amount of debris carried by it. A reasonably heavy lead weight having a flat rather than a pointed base suspended by fine wire on which marks are fixed at every five feet will usually answer best for use in deep water. There will be a tendency to carry the line down stream but a competent man at the line can catch the reading sufficiently near to the vertical position and the error, if any, will be on the side of safety, making the depth possibly somewhat greater than it actually is. It is also well to have the depth below base of rail painted on the masonry, or other permanent marker in position, so the height of the water can readily be seen and recorded at the time the soundings are taken, especially if such soundings are being taken by men working from a boat or a raft.

Where small streams are crossed by pile trestle bridges, the chief cause for alarm usually arises from debris such as trees or dead branches lodging against the bents and either diverting the stream so that it may wash out around the end of the structure or undermine adjacent bents. As soon as the water begins to rise to an unusual height men should be stationed at the bridge to keep the

debris on the move. In most cases it is comparatively easy to keep it moving as fast as it arrives, but if it is allowed to pile up for several days it may become a tangled mass very difficult to handle. At times of low water when bridge crews are doing other work on the structure, care should be taken to see that all old piling or snags of any kind which might make a lodging place for debris are removed clear down to the river bed. Soundings necessary at this type of bridge can usually be taken by men working from the trestle using a long rod or in case of very deep water, a lead and line.

Guard Against Approach Washouts

In most cases at small bridges of the permanent type the chief trouble arises from washouts at either end of the structure because the opening is too small for the tributary drainage. Soundings are often necessary to determine whether or not the rip rap protection is being undermined. If the rip rap wall was started well below the bed of the stream there is usually little cause for concern unless something is allowed to lodge in the stream in the immediate vicinity of the bridge, further contracting the available opening and diverting the stream.

Deep and even swiftly flowing water is not usually a serious menace as long as there is nothing to interfere with its free passage. Flowing water has a force not always realized and nowhere is an "ounce of prevention" worth more than in the proper directing of flowing water. Thorough preparedness for trouble and complete and accurate records of every structure are the essential things. The bridge records should show the penetration of every pile in pile trestles and the location of the stream bed with reference to base of rail. The records of the foundations of the more permanent structures should show the penetration of each pile on which the masonry rests and if no piling, there should be a clear record of the kinds of material penetrated when making the excavation and the exact depth of the bottom of masonry or timber grillage below base of rail. It may not be possible from the standpoint of economy, or even practical construction, to build every bridge so that it will be proof against the unusual storm that may come but once in 15 or even 10 years, but by having perfect records and by close attention, these vital places in the railroad may be readily maintained in times of trouble so as to insure complete safety of life and property.

An Interesting Turntable Renewal

By E. B. Fithian
Division Engineer, Missouri Pacific, Poplar Bluff, Mo.

Hoxie, Ark., is a division terminal for freight and passenger locomotives and handles approximately 28 engines daily. Washouts, running repairs and some heavy repairs to locomotives are handled at this point. Having decided to replace the 82-ft. turnable at this point with a 100-ft. structure, one of the first considerations was to get as much of the work done as possible and at the same time keep the roundhouse, consisting of 15 stalls, in operation so that when the old turntable was taken out of service to permit the removal of the old center bearing and the construction of the new one there would be a minimum loss of time. On account of the mechanics being required to work on locomotives out in the open while the turntable was out of service, the month of September was selected as the proper month for the work.

Starting the New Table Down the Incline.

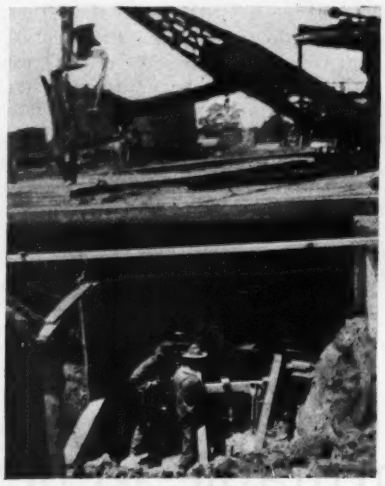
The performing of that part of the work that could be done without disturbing the turntable involved considerable expense and necessitated taking advantage of every mechanical device available to assist in carrying out the work. The division was fortunate in having available at the time equipment that could be furnished promptly when needed.

The old turntable was constructed on a concrete center pier with concrete foundation for the circle rail and a pile and timber back wall. The new table being 18 ft. longer than the old table, the excavation for the new concrete circle back wall and the foundation for the circle rail could be made without disturbing the old pile circle wall. To handle this excavation (which was 13 ft. wide and 11 ft. deep) by hand would have involved slow and expensive work and to reduce the cost, as well as to expedite the work, it was decided to use an American ditcher, operating on a floor of bridge stringers laid directly over the trench; one end of the stringers resting on the old circle wall and the other end on the ground outside the trench, as shown in the illustration on the next page.

This method permitted the operation of the turntable while the excavation work was under way, the material being hauled away by teams. When the excavation reached the tracks extending into the roundhouse about four of the tracks were taken out of service at a time, and, after the completion of each day's work of erecting a temporary trestle over the openings to permit engines to pass over these tracks. No dirt was deposited by the ditcher on the three approach tracks to the turntable or on the tracks to the roundhouse, as the machine would travel with its dipper load and deposit dirt beyond the tracks. It took a little less than ten days for the ditcher to travel the entire circle and complete this part of the excavation, amounting to about 1,700 cu. yd.

The 155 piling for the foundation of the new circle and back wall were also driven without interfering with the operation of the turntable by using a self-propelling

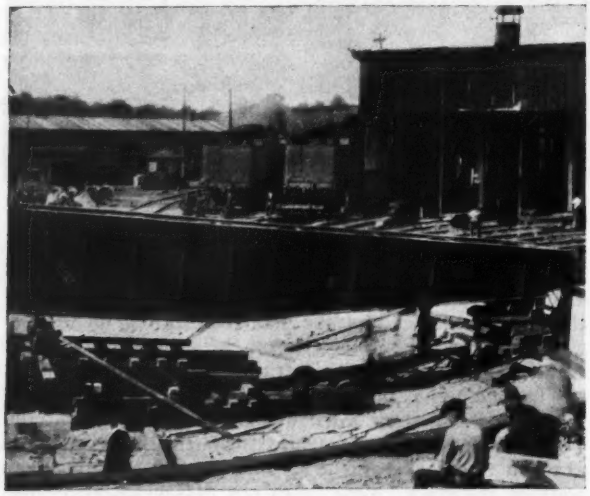
driver which was operated from the approach tracks to the turntable. About six moves of the driver were required to complete the piling work. The concrete base for the circle rail and the circle back wall, as well as that part of the circle back wall not under the approach tracks and roundhouse tracks, were completed before putting the turntable and roundhouse out of service, as well as all other work excepting that which could be done while waiting for the concrete center bearing pier to set sufficiently to permit placing and operating the new turntable.



Cribbing After Excavating for the Circle Wall

When ready to remove the old turntable, one end was jacked up and the other end was raised by a steam derrick and an inclined track was constructed on cribbing. A car truck was then placed under and near the center of the table and, with a steam derrick guiding it at one end, the structure was pulled up the incline and carried to a point where it could be loaded on cars.

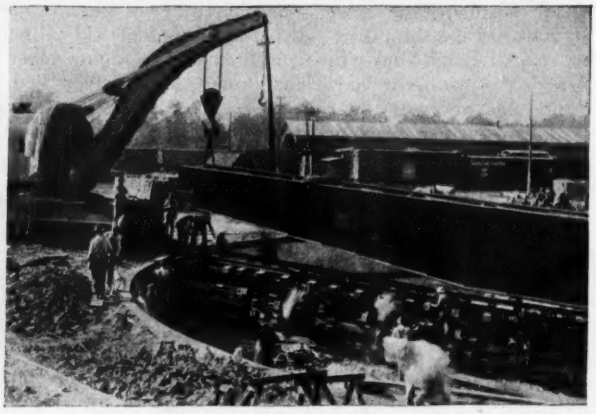
As soon as this was done, the old center was blasted out and excavation for the new center was made to a point 17 ft. below the base of the turntable rail. Most



The New Turntable After Removing the Truck

of this excavation was made with a clam shell and the material was removed by teams hauling the dirt out on a timber incline.

The new center was constructed with a pile foundation consisting of 32 piles driven by a track driver operating on a cribbed track across the pit. The cut-off on these piles was 16 ft. below the base of rail. The construction of the jacking blocks, the completion of the back circle wall under the tracks to the roundhouse and the placing of the circle rail ties and the circle rail was carried out while the concrete in the new center was setting. After this work was completed, the new turntable, weighing 68 tons, was unloaded from cars and set in place the



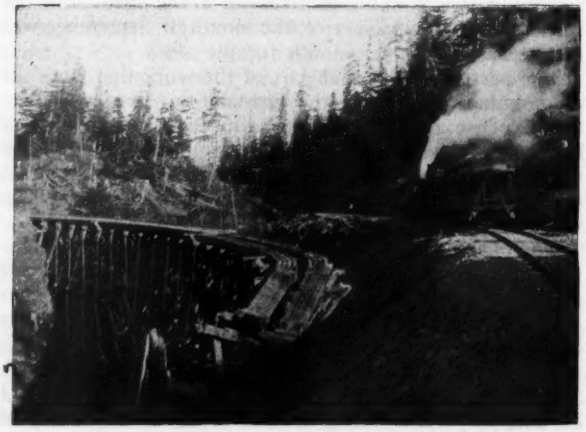
Preparing to Remove the Cribbing

same way that the old one was taken out. The derrick began unloading the turntable about 9:30 a. m. and had it placed on the center by 4:15 p. m., the men taking one hour for lunch. The turntable and roundhouse were out of service from September 10 to October 18 and would have been ready for service by October 10 if there had not been some delay in the receipt of the steel.

Rules for Motor Car Operation

THE FOLLOWING suggestions were taken from a paper read before a safety meeting on the Minneapolis & St. Louis at Fort Dodge, Iowa, by N. P. Anderson, section foreman at Curlew, Iowa:

1. See that the wheels and body of the motor car are kept in good condition.
2. Always see that the tools are kept in proper place on the motor car so that they cannot fall off while running.
3. Start the motor running so men do not need to be pushing and jumping on the car after starting.
4. Slow down the speed while running over switches, frogs and public crossings.
5. Always keep the motor car off the track while working.
6. Stop before going around each curve, making sure no trains are approaching. In case of doubt, flag around.



A Change of Line on the Alaska Northern

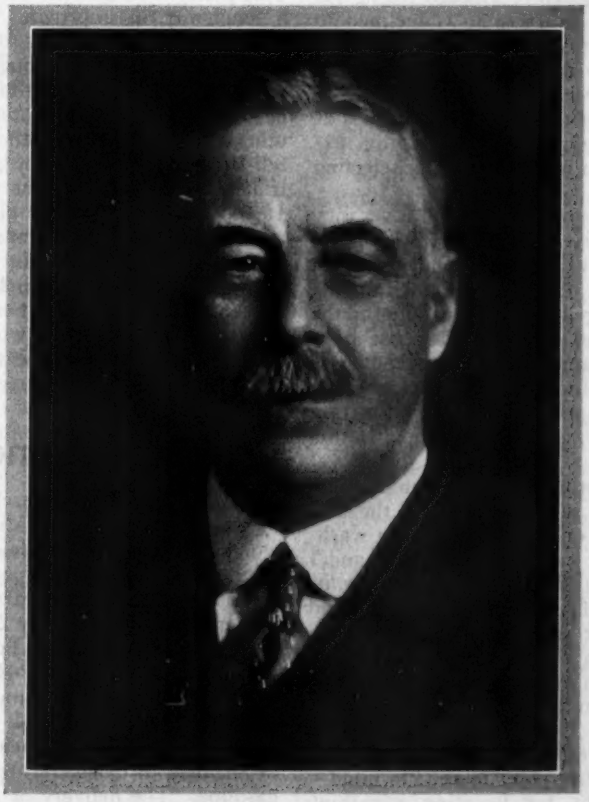
"It Doesn't Pay to Revolutionize a Job As Soon As You Get It"

"The Chances Are," Says President Aishton, "That the Fellows Ahead of You Knew What They Were Doing"

By WALTER S. LACHER

"WHAT ARE the chief requisites for executive ability?"

It seemed most appropriate to put this question to Richard H. Aishton, president of the American Railway Association, since this position throws him in almost daily contact with the leading officers of all the railroads and gives him a most favorable opportunity to study them in action. Then there was his position as regional director of the North Western region of the United States Railroad Administration, to which he was appointed in January, 1918, from the presidency of the Chicago & North Western. In this position he was not only called upon to build up a regional staff with men of adequate calibre for new and untried positions of great responsibility, but he was also required to observe the methods and results secured by the officers of the numerous railroads operated under his regional jurisdiction.



Richard H. Aishton
President, American Railway Association

"A man's success as an executive," said Mr. Aishton, "depends primarily on what his subordinates think of him. If they know that he has a thorough knowledge of their work, that he is right on the job, and if they feel absolutely sure that he is on the square with them, he will have no trouble in getting them to work for him, or rather I should say—work with him. That, after all, is the real test of executive ability whether one is a section foreman, a roadmaster, a general manager or a president.

"But to get a complete knowledge of anything as complicated as a railroad takes a lot of time," I suggested.

"I was just getting to that," he interjected. "A man's career may be divided into two periods. The first is the educational period, during which a man is occupied mainly in learning as much as he possibly can about his own work and that going on around him, and if he sticks to it he will gradually acquire a thorough knowledge of the business. This in a sense will be his stock in trade, the one big asset that makes him invaluable to his employers. If he completes this period with credit, his success is assured.

"During the first period, what he is paid is not nearly so important as what he learns. During the second period the matter of pay will take care of itself because it is then a case of 'the job seeking the man.'"

"But all men do not finish this course."

"That is very true. Some men also finish sooner than others. Some may get this education in 10 years, some in even a shorter time. In my own case I have placed it at 20 years, figuring from the time I entered the service until I was made a general superintendent.

"I got my first railroad job back in 1879. Leaving school at 16, and after working for a while in a book store in Evanston, Ill., and later as a shipping clerk for one of the packing plants in Chicago, I got a job as a stakeman on location work for the Chicago & North Western in South Dakota with a salary of $30 per month. This was an interesting experience for me in every way, and when I tell you that a part of my job consisted in taking my turn at standing guard at night with a rifle because of possible trouble with Indians, you can see that, among other things, I had a chance to learn self-reliance. Because I stuck to my job when other fellows quit, and not because of any particular ability, I was later moved up to rodman. This promotion meant a lot to me because it gave me a chance to watch the fellow running the instrument and I never missed an opportunity to learn as much as I could about his work so I could take my turn at it.

"One often wonders what a fellow can get out of office work. In my case it gave me a thorough training in arithmetic. When I left school I wasn't any too strong at figuring, but after I spent three solid months computing earth work quantities from survey notes under the supervision of a man who was an expert mathematician and a hard task master, well, I had received a training in figuring that I would not have missed for anything.

"Later I was given a residency on construction and, as it often happened in those days of rapid railroad expansion, I was taken into the maintenance organization when the line was finished. My first maintenance

of way job was called 'engineer of maintenance.' A little later I was made assistant superintendent of bridges and buildings and after two years more, in 1889, I was promoted to division engineer.

"Maintenance of way work, like any other branch of railroading, is a game. You have a chance every day to do the job a little better than you did it the day before. If you keep your eyes open there is always an opportunity to learn something new or a chance to solve some new problem. When you are put up against a hard problem, get the other fellow's 'slant' on it, get all the facts and opinions you can, and then make your own decision. That is a rule that applies to any position. It's the same for the roadmaster as for the general manager."

As to the manner in which Mr. Aishton put these ideas into practice, it is said of his work as a maintenance officer that he spent most of his time on the road getting a first hand knowledge of the work. However, much as he always made it a point to know all the details of the work, he has consistently avoided telling his men how to do their work. In fact, he is inclined to get very much out of patience with the man who insists on telling *how* he is going to carry out an assignment. What he insists upon is the *result*.

A close contact with the work is necessary for an intimate acquaintance with the men, and Mr. Aishton explained that this has stood him in good stead in selecting his assistants.

"Whenever an officer needs some man to fill a vacancy in his organization he instinctively goes over in his mind all the men he knows who have had a training that puts them in line for the position. He considers each one of these in turn, measuring his general qualification for the job and also keeping in mind any incidents that have served to demonstrate his value in an emergency. It makes no difference what position the man is occupying, it is his qualifications you are after. He may be a train dispatcher, a division engineer, a roadmaster, or a station agent.

"You can never tell," continued Mr. Aishton, "just where the good material will turn up. One of the best assistants I ever had I found on a pile driver at a washout. The pile driver was not busy all of the time and I noticed that the fireman, instead of sitting around waiting until he had to put in a fire, got out on the ground with an axe and trimmed pile ends or helped around on the driver whenever he had a chance. Here, I thought, was a man with real ambition and I am glad to say that I have never had any reason to regret the selection I made at that time.

"To turn again to this matter of success as an executive," he added, "here is another point to keep in mind—give your subordinates credit for knowing something about their work. I learned this lesson in 1893 when I was promoted from division engineer to superintendent. This change from a maintenance to an operating position is a most critical one for any man. It worried me more than any promotion I was ever given. So when the general superintendent told me of my new duties as assistant superintendent, I asked him if there was any advice he could give me.

"I will always remember his answer, which was something like this. 'Well, just now things are going all right. Don't stop the machine, because if you do the chances are that you won't be able to start it again.' What he meant was this. It doesn't pay to revolutionize a job as soon as you get it. The chances are that there are a lot of fellows working under you who know what they are doing. It is a big mistake to assume that everybody who had anything to do with the job was incompetent.

"Don't go on the job with the idea that you are *directing* the work. Make the men feel that *they* are doing the work and that your job is to help them all you can."

It is well known that Mr. Aishton has followed this rule implicitly himself. For instance, in 1896, when he was promoted to division superintendent he was placed in charge of a division where conditions were particularly trying for the train crews. The main line was badly congested and conditions for the time were aggravated by interference arising from the construction of a much needed second track. The result was a totally disheartened operating force.

To meet this situation Mr. Aishton called a series of meetings for the train and engine crews, at which he explained that it was his purpose to help them better conditions in any way that was physically possible. The men were then given an opportunity to complain of any objectionable conditions and to suggest any remedies they had to offer, and he either promised to rectify matters or gave reasons why no improvement was possible. This policy won him the confidence of the men and went a long way in improving the esprit de corps on the division.

"There is one other thought I would like to leave with you," continued Mr. Aishton, "and that relates to the need of putting a human touch in the work of directing others. If a man has an idea, give him a chance to tell of it, and if it is any good give him credit for it; if not, let him find it out without hurting his feelings. If you have reason to be disappointed or disgusted with a man's work, by all means let him know it and put it strong, but don't do it in the presence of others, and furthermore, if you learn later that you were mistaken in censoring him don't hesitate to tell him. All men like to know that their work is appreciated, so if you feel that a man has done a good job it will help a lot if you tell him so."

Large Gasoline Consumption*

THE GASOLINE purchased by the Illinois Central and the Yazoo & Mississippi Valley during 1921 would run a popular make of automobile 8,812,560 miles at the rate of 20 miles per gallon of gasoline, or over 1,100 times around the earth, and would keep that same flivver going continuously 24 hours per day at a speed of 20 miles per hour for a little over 50 years. The total gasoline purchased was 440,628 gal. and the cost was $97,051.39. Of this amount the maintenance of way department used 332,417 gal. which cost $72,709.84.

This represents an expense to the maintenance of way department of over $6,000 per month or $200 per day for gasoline. The delivery of this gasoline required the use of 6,648 drums which, placed end to end, would make a string nearly four miles long.

It is not at all difficult to waste gasoline in many ways. A great deal of gasoline is wasted by careless handling and in storage, as when drawing gasoline from a drum or transferring it from one can to another or filling tanks on motor cars. Gasoline spilled in this manner is not only a waste but is also a serious fire risk. Gasoline is very volatile and if drums or cans are left open the loss through evaporation is very rapid. Washing the hands and pieces of machinery in gasoline is a very wasteful practice. More gasoline is wasted in this manner than is generally realized.

Reasonable care should reduce the use of gasoline at least 20 per cent, which will represent a saving of $20,000, an amount sufficient to purchase 80 new motor cars.

*From the Illinois Central Employees Magazine for June.

"Conscience Doth Make Cowards"

"I'd Rather Work all Night and Lose a Month's Pay Than to Go Through That Again"

By Charles H. Smith

IT WAS EXACTLY 3:10 when Foreman Wakefield's men began spiking the heavy frog which they had pried and pounded into position with crow bars and sledges. Wakefield looked the work over with a critical eye as his men hastened to finish the job before quitting time at 3:30. The foreman knew that his men could not complete the work within the remaining 20 min., pick up their tools and return to the car house and get off on time. Mentally he debated whether he would keep them working a half hour or so overtime and complete the work or would finish it as best he could within the remaining few minutes of the regular day.

A switch engine approached pulling a string of cars. Wakefield looked up and saw the conductor, Ernie Knapp, leaning from the side of the cab. He raised his hand in salute. The foreman had known Ernie for a long time. In fact, he lived only a block from the conductor's home and dropped in now and then for a friendly chat with him. Besides this, they both got off duty at the same time and frequently walked home together.

"I'll be back in fifteen minutes," shouted the conductor as the noisy engine puffed past the trackmen. "Wait for me and I'll ride up to the car house with you."

The foreman nodded assent. When the drag of cars had passed by the trackmen resumed their task. "Let's hustle this up a little, boys," suggested Wakefield. "We'll have to if we get off on time. Can't quite finish it today, even then, I guess. But we can make it so that it will be very nearly finished."

So quickly did the men work that when Knapp came back a quarter of an hour later the job of installing the new frog was almost completed. But one thing remained to be done, and it is quite probable that this would have been accomplished also had not the arrival of the conductor prevented it.

"Ready?" he asked.

"Will be in half a minute," replied Wakefield. "Men, put the car on the track and load the tools."

The conductor inspected the new frog. "Say, Carl, you've forgotten to put foot guards in this frog," he commented.

"I haven't forgotten them," answered the foreman. "We haven't the time to put them in today. I guess it will be O. K. without them for a few hours, won't it?"

"Maybe it will," said Knapp. "But they're mighty bad things to trap a man's foot."

"I know it," agreed the foreman. "And this is the only frog on my territory without guards. I don't take any chances with them if I can help it."

They seated themselves on the car and started for the car house. Twenty minutes later they separated at the corner where their paths diverged.

That night Wakefield went to a lodge meeting, where he got to talking with Downey, one of the men from the North Yard.

"Hear about that accident on Rumley's section?" asked the North Yard man.

"No. What was it?" inquired Wakefield.

"Polish woman picking up coal. Got her foot caught in a frog some way and a southbound freight hit her. Cut her leg off just below the knee. Frog didn't have any foot guards, so they say. I suppose someone will hear about that."

"Bad business," said Wakefield as he instantly thought about the frog he had installed that afternoon and which he had left unprotected.

"Yes, it is bad business. Eight or ten children in the family. Of course, the woman had no business on the track. But you know how it is—they will come after coal. If it had been a trainman or some railroad employee the company would probably have had a big claim against them—because there were no guards in that frog. Maybe there will be a lawsuit anyway. . . . Oh, well," he concluded philosophically, "I suppose it can't be helped now. It's a reminder for the rest of us fellows, though. It's best to keep them protected all the time."

"Yes—it is," agreed Wakefield abstractedly, still thinking about his own unguarded frog.

It was nearly eleven o'clock when Wakefield arrived home. Despite the lateness of the hour, he was not sleepy. He took off his hat and coat, hung them up, and drawing up his favorite chair—a big, easy Morris chair—he seated himself before the anthracite burner. Picking up his pipe, he filled it with tobacco and lighted it. The blue smoke curled up from the bowl of his pipe as he settled back in his chair; behind the mica windows of the stove the fire glowed like a huge ruby with little blue flames dancing out of the red mass here and there. With such a background of comfort the foreman should have been quite happy. But he wasn't. He was worried.

Ernie Knapp had given voice to his own thoughts when he mentioned the danger of the frog without foot guards. Then the story that Downey had told him about the Polish woman having a leg taken off had intensified his apprehension. He wished that he had stayed on the job until he had completed the installation. Too late now, though. He tried to reason with himself. Not one chance in a hundred that anything would happen. No, not one in a thousand. Of course, the night switch crews and a few drags would be around the frog switching and picking up cars. But it was hardly probable that anything would happen in just one night. And yet—it might be the one night of all nights when the improbable would happen.

And what if it did happen? Suppose, for instance,

that right now a switchman had caught his foot in that frog—and an accident had resulted. The first he would know about it would be when the yardmaster or someone else called him on the phone and told him to go and safeguard the unprotected frog which had just trapped a man. And then the investigation, the claim, his own dismissal and——

A loud, shrill ring on the phone penetrating through the still rooms of the house suddenly caused Wakefield to start up from his chair. Somehow the insistent ringing of the bell coincided so exactly with his thoughts. Who could be calling him at this late hour of the night? Had there been an accident? A wreck? A call at midnight could mean nothing less.

"Hello," he called, with something like fear gripping his heart.

"Is this Walnut 7393?" asked a voice.

"No. This is 7353," he replied, vastly relieved.

"Oh, I beg your pardon."

He hung up the receiver and returned to his chair. From a nearby room came the voice of his wife, aroused from her slumber by the telephone. "Carl, aren't you going to bed tonight?" she asked.

"Just a few minutes and I'm going," he answered.

It struck him rather queer when he thought about it; the fact that the telephone should ring just when he was imagining it ringing. Nothing to it, of course—nothing at all. It was merely a coincidence, and not a very remarkable one at that.

He refilled his pipe. He would have a last smoke and then go to bed. He must cast the whole thing from his mind now. In the morning he would put in the foot guards. Yes—the first thing he would do in the morning would be to repair the defect.

* * * * * * *

The trackmen were working busily and Wakefield directed them in their task of lifting the low joints in the yard. His men jacked up the track, shot the narrow shovel loaded with gravel far back under the ties which supported the suspended joint and then dropped the track back in place. It left the joints high, of course, but as Wakefield said, "You've got to have lots of faith when you lift track. It's high—every joint you lift. But wait until a few trains have gone over them. That's where the faith comes in. You've got to have faith that the joints will level down."

The foreman watched the yard engine as it shunted cars down the different sidings. As usual, his friend Ernie Knapp was working on it. For some time he had been switching and finally, when all the cars were switched out, the engine coupled on to those going to the freight house for working and pulled out on the main. Knapp had a string of cars that he was going to take down to the North Yard out on the main and his intentions were, as Wakefield knew, to take the "house" cars on the head end of the string and set them out at the freight house and then go to the North Yard with the remainder of the cars.

When the last car had cleared the switch the conductor swung the engineer down. Closing the switch, he gave the "back up" signal. As he did so he glanced towards the cars for the North Yard on the main. The knuckle of the draw bar on the head car was closed when it should have been open. He started towards it just as the engineer reversed the engine and started the house cars backward to couple on the cars for the yard. He was hurrying to reach the car so that he could open the knuckle and the coupling would "make," and only gave a quick glance at his path. Suddenly he stumbled and fell forward. The foreman watched intently with his heart in his mouth. The string of cars was backing directly upon the conductor. Why didn't he get up? In another second Knapp rose to his feet and began struggling frantically—his foot was imprisoned in the wedge-shaped opening of the frog, the very frog that the foreman had failed to protect with foot guards. The question jumped into Wakefield's mind: Why hadn't he put in the guards? He had intended to do so. He could find no answer.

He began waving his arms and shouting to the engineer on the switch engine. Would the man never see him? Was he deaf? Relentlessly the cars moved slowly towards the conductor struggling with all his might to free his foot. They drew closer and shut the struggling man from Wakefield's sight. He turned his head away. A strange nausea seemed to seize him and he suddenly felt deathly sick. A second later he heard the draw bars crash together. The string of cars came to a standstill.

Somehow he managed to pull himself together and go over to where Knapp lay on the ground. Was he dead? A leg taken off? A glance confirmed his fears. Knapp lay beside the rail with a very white face. He was only partly conscious. Then as Wakefield's eyes shifted quickly from the man's face to his body he learned the gruesome truth. The foreman groaned and covered his eyes.

He was only dimly aware of the gathering crowd of people, the weird sound of the siren on the police ambulance as it neared the spot, the doctor administering first aid, the lifting of the stricken man to a stretcher and carrying him to the ambulance, which swiftly departed from the scene bound for the hospital, its siren screeching like the wail of a dying person.

How Wakefield arrived at the hospital he did not know. Whether he walked, ran or rode he could not have told. And how he gained entrance to the room wherein the conductor lay on the white iron hospital bed, with a white-clad surgeon and white-clad nurses in attendance, was equally unexplained. In fact, it seemed as if a series of pictures were being flashed on his mind with details and individuals unnaturally clear. He watched silently and sorrowfully as the physician did what he could to make the injured man more comfortable. Somehow the foreman felt that though he was vitally concerned with everything, still he was detached—apart from all the rest. No one seemed to see him; no one paid any attention to his presence.

Then Ernie Knapp turned his face towards the surgeon at his side. He seemed to speak.

Almost as he finished speaking the door opened and the conductor's wife stood on the threshold, looking anxiously for her husband. Her cheeks were tear-stained and her dress betrayed that she had left her home in haste. As her eyes rested on her husband's ashen face the tears welled up in her eyes and started afresh. "Oh, Earnest!" she cried, and, going over to the side of his bed, she dropped to her knees and sobbed heart-brokenly. A small lad of perhaps eight followed his mother into the room and stood awkwardly with his cap in his hand, awed by the grief of his mother and the sight of his father lying white-faced on the bed. Then he, too, began to cry.

Ernie Knapp weakly lifted his arm and placed his hand on his wife's head buried in her arms resting on the side of his bed. "Don't take it so hard, Mother," he said softly.

"I can't—can't—help it," she sobbed.

For a moment he looked at his wife affectionately. Then his eyes turned towards his son who was weeping softly as he stood beside the door. "Come here, Earnest," he said. The boy timidly drew near to his father's bedside. For a little space the father looked at his son

without speaking. It seemed as if he were striving to imprint a farewell picture of the boy on his memory.

"Dad's going away, Son." He paused a minute for strength. The room was very still, save for the quiet sobbing of the boy's mother. "Always be good to your Mother, my Boy," he continued when he had regained his breath. "You will—won't you? Promise Dad that you will."

The lad silently nodded his head, unable to speak.

He paused again, unable to continue. The two nurses standing nearby silently pressed small white handkerchiefs to their eyes. The white-clad surgeon was looking out the window.

A few minutes later the conductor moaned and called out faintly: "Put me to sleep as quick as you can, Doctor—I can't stand this awful pain any longer."

The white, pain-drawn face attested the agony the man was enduring and without hesitation the surgeon, assisted by one of the nurses, administered the anesthetic. In a few minutes Conductor Knapp had sunk into sleep—a sleep which was to know no awakening.

* * * * * * *

Wakefield awoke. For a few seconds he could not free himself from the vividness of his dream. He found himself choking back sobs which persisted in rising in has throat. The hard-coal base-burner still glowed, but not so rosily. He rubbed his eyes a minute. Then he drew his watch from his pocket. It was three a. m. Rising hastily, he found his hat and coat and, putting them on, left the house.

A half hour later had anyone been looking they might have seen someone carrying a lantern from the car house to the new frog. A figure bent over it and, after fitting wedge-shaped pieces of planking into it, slipped them into place and spiked them down. The path of the lantern then led back to the car house, where it flickered for a moment and then disappeared.

It was nearly five o'clock when the foreman re-entered his home again. He took off his hat and coat and hung them up. Then he reseated himself in the easy chair and lighted his pipe. It was of no use to go to bed now. It was, in fact, getting-up time. He gazed at the ruddy fire contentedly. A great load had been lifted from his mind and he was happy.

"Of course," he told himself as he thought it all over, "of course, nothing really would have happened. But—well, it might—and anyway, I'd rather work all night and lose a month's pay than to go through that again."

Improving the Line and Surface of Track*

By G. T. ANDERSON, SR.
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THE SECRET OF putting up good, smooth track that will remain is in having the men well organized and in getting them to do the work as nearly alike as possible, although it may require close supervision of the foreman in order to get the work done properly. Uniformity in the work is essential, improper tamping represents money thrown away, and close supervising by the foreman is necessary to see that efficient work is accomplished. In many cases those in charge of the section foremen or the supervisors, or roadmasters, judge the ability of a foreman by the amount of track raised, thus encouraging poor work. The quality should be taken into consideration first, for if it is justifiable to do a piece of work, it should be well done, even if it takes more time and expense.

Should a Tie Be Tamped Throughout Its Length?

The question is frequently asked and discussed by track foremen, "Should a Tie Be Tamped Throughout Its Entire Length?" Unquestionably it should, so as to furnish as solid a bearing as possible for the rail. This applies where track is being raised two inches or more, but care should be taken that it does not become center-bound; in other words, the center of the tie should not be tamped as hard as the shoulder or end of the tie. Since it has become necessary to use so many inexperienced men who have not been in the service a sufficient time to become interested in the work or learn how to do it properly, in my judgment the tampers should be organized to tamp the track in the following manner: (This method applies only to surfacing gangs, as ordinarily section gangs have only four or six men, so that their work can be watched closely by the foreman.) Four pair of men should be assigned to tamp the ends of the ties on each side of the track, under which plan the head pair should tamp every fourth tie, the next pair the tie behind, and the third pair the third tie, etc. The men tamping the center of the ties should follow a similar system. Besides keeping the work close together without interfering with each other, this method makes it possible to get more work out of those men who would otherwise "soldier" on the job. More important still, the track as a whole would be tamped in a uniform manner, due to the fact that in a gang of any size there would be some experienced men. The old method, under which we have labored, was that of assigning each pair of tampers to a half rail length or more of track. Since experienced men usually prefer to work together, the work done by all the teams under this plan is not uniform, the portion tamped by the best tampers standing up better than the track tamped by inexperienced men. Consequently the track settles unequally and becomes rough. However, where good tamping is mixed with the poor, the track is more likely to settle uniformly. Then, again, the old method may necessitate raising considerable track in order to assign men to half rail lengths or more, while the suggested method would allow working the men closer together, as a result of which it would seldom be necessary to have over two rails raised at once, a distance which could easily be closed up for a train in a short time.

Using the Tamping Bar

When the raise is small and roadbed is solid, the tamping bar is the most efficient tool to use. It is seldom, however, that tamping bars are profitable in surfacing new track or track where improper drainage causes soft roadbed. It requires more time to tamp a tie with a tamping bar than a shovel, especially in gravel or chat ballast, and if the subgrade settles, the track will settle, no matter how well the ballast has been tamped under the tie. First-class track cannot be put up without the use of tamping pick or tamping bars, especially in gravel or stone ballast, and it is quite often necessary to go over some of the track which has been surfaced and tamp up

*From a paper presented before the Kansas City Southern Maintenance of Way Association and later before the Delaware & Hudson Maintenance of Way Association, and printed in a bulletin of the latter organization.

some of the joint ties and low places that have developed after trains have passed. This usually applies where track has been given a lift of two inches or more.

The Foreman's Problem

A record made in surfacing track is a fine endorsement for a foreman. It is difficult, however, for most new foremen entering the service who have not had experience with soft track to take hold of a section and handle the raising in a satisfactory manner on track that is affected by soft roadbed.

It often occurs in passing over a section of track that it looks to be in uniform surface, yet it rides roughly. Each individual rail may appear to be in fair running surface. Yet if the track is out of cross level, running low first on one side, then the other, this condition causes the weight of the train to be thrown unequally on the rails, causing rough riding. Under this condition, the tendency of the trains is to increase settlement on the low side, which results in the track becoming still rougher. By using the level board, this defect will be corrected. Some foremen make a mistake by thinking they can tell when the track is level by the eye. I have often heard track foremen make the remark that they can surface the track without using a level board, but I have never seen anyone prove it in a test.

Foremen can test straight track, first by finding a spot where the track is absolutely level, placing the level board on the handcar crosswise, block it to read level, then push the car along slowly, and notice how the bubble varies, and where the low rail changes from one side to the other. The common method is to place the level board on every half rail length. However, this consumes more time than the method just mentioned.

In my judgment, the foremen should ride over their sections occasionally on the engine or rear end of trains, preferably the engine. They should not make it merely a pleasure trip, but note how the engines and cars ride and what causes good places and bad places. A train running at the rate of 45 miles per hour will not ride as smoothly as one running at 25 miles per hour. Cars running at the lower rate of speed have more time to right themselves after the wheels meet the places out of line, gage or surface. When a train runs along smoothly, then suddenly swings to one side, there are three possible defects: track out of line, surface or gage.

When picking up low joints in stone or gravel ballast, particularly where the depression is slight, tamping bars or picks should always be used. It is preferable to use tamping bars with a man on each side of the tie. They should strike together in order to tamp the ties to proper surface, and tamp the ballast firmly under the tie.

Correcting Other Causes of Low Joints

There are many things other than weak foundations which make low joints in track. A few joints permitted to remain low will result in the cross level of the track becoming worse. Loose bolts will make low joints, because when they become loose they permit angle bars to bend down under the weight of the engines or cars. Bad gage will also make low joints, as the cars, when trains run fast, are thrown heavily from one side of the track to the other, and the joints, being the weakest point, are affected most. Improper expansion between the rail ends will also result in making low joints, as they assist the car wheels in battering the rail ends, which makes for a bad condition in a very short time. In smoothing up track, joints in such condition as mentioned should be raised one-fourth inch higher than the balance of the rail and tamped up with tamping bars. It is important to bring joints to proper gage if found out of gage.

The opinion of trackmen on the super-elevation of curves has changed materially. It is not customary to give as much elevation to curves as formerly. Too much elevation is a constant source of trouble, as it produces excessive wear on the inner rail, causes the cutting of ties, provided they are not tie plated, and displaces both line and surface. Too much elevation greatly increases the weight of the inner rail, which will cause it to settle, increasing still further the super-elevation. In yard tracks, or on sidings, it is not necessary to provide elevation unless the track is used by high speed trains. Since the elevation required is a function of the speed, the speed is the controlling element. When curves are spiralled the track should be level at the point of spiral and should increase to full elevation at the point of circular curve. Where curves are not spiralled, it is good practice to give three-fourths of the full elevation at the point of curve and run the elevation out on the tangent at the rate of one-half inch to each inch of rail, depending upon conditions.

Watching the Alinement

Nothing contributes more to the smooth riding of trains than true line of track. Track should be kept in perfect line at all times. A foreman while lining track should do as much as possible of the work in the early part of the morning or late afternoon in order to have his back to the sun, in that manner getting the best view of the rail. It is also necessary to look at the line of the track from the opposite direction, especially when lining a long piece of tangent track of the end of curves, provided he is not furnished with center stakes.

A common fault with foremen in not lining the last few rails on tangent track approaching curves is to throw the track too far out. Very few men can line track perfectly by going over it only once. To do this, they must be experts and have a perfect vision. One should always stand as far away from the place which is to be lined as his vision will allow, for when in standing too near one is liable to throw a swing in the track. This is a fault of many foremen, which should be avoided.

If a piece of track has been left in bad condition by some previous foreman, the succeeding foreman should show his ability by working out its defects every time he has an opportunity. After the track has been properly surfaced and gaged, it should be put in perfectly true line. While some foremen seem to give this part of the work the attention it deserves, others do not, and it is a common fault of a number of foremen not to obtain a true and perfect line on track. The surface may be perfectly level and smooth, but cars ride badly over it at a high rate of speed. The wheels follow the crooked line and bad gage causes the cars to swing almost as if the surface of track were rough. Furthermore, bad line and gage will soon make the surface rough. There is no excuse for bad line and gage in track. When there is sufficient ballast for surfacing and leveling up the track, all that is required is a little skill, care and a good eye, and enough help. All of these requirements should be found on any section.

A well lined section is the best indication that the foreman in charge of it thoroughly understands his business. A good line cannot be maintained without having a true surface. In order to preserve the line of track as originally located, I believe permanent monuments should be set to indicate the center of the track. These monuments would be of great benefit to the trackmen and would save replacing centers by the engineers when needed. I feel that permanent track centers would aid greatly in maintaining both line and surface and that if set they would shortly produce a much more satisfactory track.

Eradicating Sickness Among Employees*

Malaria Control on St. Louis Southwestern Adds to Efficiency of Maintenance Forces

RAILROADS in the South face a serious problem in the widespread prevalence of malaria. The degree of prevalence of malaria in any community is probably a fair index of the efficiency of its labor. A high malarial rate means an excessive turnover among recruited labor and a definite loss through replacement of salaried employees during illness.

Building operations are slowed up during favorable summer and fall months because of "chills and fever"

Some of the Culverts Were Found Too High for Proper Drainage

among employees. An unwarranted amount of capital is tied up in equipment and tools due to low efficiency of labor. The average malaria patient is of little worth some time prior to being ill enough for hospital treatment, but usually receives full pay for his time. But the greatest cost of malaria to a railroad is from the large number of men who continue to work while infected, sometimes for years, and who return but feeble effort for their salary and wages.

Conditions on the St. Louis Southwestern

The hospital books of the St. Louis Southwestern dis closed the fact that 2,407 were given treatment for malaria during the years 1913 to 1916, inclusive, or an average of 602 cases per year. Of these, 43 per cent were section, 22.3 per cent extra gang, 14.7 per cent bridge and building, and 12.2 per cent shop employees.

This record of 602 cases per year, it will be remembered, includes only a record of those men who required hospital treatment and represents possibly only one-fourth of the total number of employees suffering with chills and fever during this period. These hospital malaria patients comprised 25.5 per cent of the total medical and surgical cases, or 32.8 per cent of the strictly medical cases. Obviously, a considerable part of the medical relief furnished the employees from 1913 to 1916, inclusive, was chargeable to malaria.

The adoption of malaria control engineering by the St. Louis Southwestern followed closely the successful application of sanitary science in several places in the United States. Scientific investigation had developed the fact that a person suffering with malaria, or "chills and fever," has in his blood the parasites of malaria, which are very numerous and live at the expense of the red blood cells that are essential to life. These parasites get into the blood only through the bite of certain kinds of mosquitoes. When first hatched the mosquito is harmless. It must acquire the infection by sucking up blood with malaria parasites in it from a person suffering with the disease, and must live a week or more before it is able to carry the infection to a well person. The problem of malaria control is thus one of breaking the line of communication of the mosquito from a person already infected to a well person and eradicating as many as possible of the mosquitoes.

The Nature of the Problem

The problem of protecting railway employees from malarial infection is complicated because of the conditions under which certain of them live and work. Thus, men employed in the bridge and building department, on extra gangs and in water service, live in camp cars and are moved as necessary from point to point over the line. Men in the bridge and building department are compelled to spend much of their time in the river bottoms. Section forces are usually recruited from farmers along the line who are not informed as to means of protection from "chills and fever."

Specifically, the problem confronting the St. Louis Southwestern was one of applying the measures then at hand for the control of malaria to its employees scattered along some 1,800 miles of track, living and working as outlined above under conditions different than those encountered in the control of malaria in cities and towns. Co-operation between communities and the railroad in solving this problem was manifestly an important consideration.

Where Swamps Could Not Be Drained They Were Sprayed With Oil

On request, the United States Public Health Service detailed officers to assist in the initiation of the measures adopted by the railroad for malaria control. Field work began in May, 1917, and was carried on by the United States Public Health Service until July 1, 1917, at which time a sanitary engineer was appointed a general officer of the railroad and placed in charge of malaria control work under the personal supervision of the president.

*From a report on malaria control on the St. Louis Southwestern for the period from 1917-1920.

The field operations involved in this work consisted in removing mosquito breeding places from each community, and from the areas extending three-fourths of a mile from the inhabited portions of these communities. Control was effected by dewatering, filling, partial drainage, trimming banks of streams, clearing and stocking ponds and streams with top water fish, and oiling with drip cans and knapsack sprayers. The drainage and oiling operations were performed by a "Malaria Extra Gang," moved from one city under control to another as was found necessary.

Among the employees themselves, the methods of control consisted, in the case of the bridge and building, water service and extra gang men, of screening bunk cars with 16-mesh wire, issuing quinine in prophylactic doses free of cost, swatting mosquitoes in cars, spotting outfit cars whenever possible in localities free of the malaria mosquitoes, and conducting an educational campaign, while in the case of the section men it consisted of screening of section houses owned by the railroad, furnishing quinine free of cost in prophylactic doses, eliminating mosquito-breeding areas adjacent to section houses, and conducting an educational campaign, including the swatting of mosquitoes in houses and bunk cars.

In order to reach more railroad employees than were afforded protection in the cities under control, an exhibit car was equipped to be moved over the line. This car contained a number of exhibits, charts and models, designed to teach the history of malaria, and self-protection from malaria to railway employees, as well as to people living along the railroad. A number of lectures and talks were also given to school children during the summer and fall season with this car. The value of this work was so apparent that a more modern and better equipped car was established in 1920.

Every Attention Was Given to Bridge and Building Men

The camp cars in which the bridge and building department men lived were screened with 16-mesh wire prior to the malaria season of 1917. "Swat the Mosquito" placards were tacked on screen doors. Other literature bearing on the necessity for the proper screening of cars and for swatting mosquitoes in cars was distributed over the system. Personal talks were made whenever possible to bridge men.

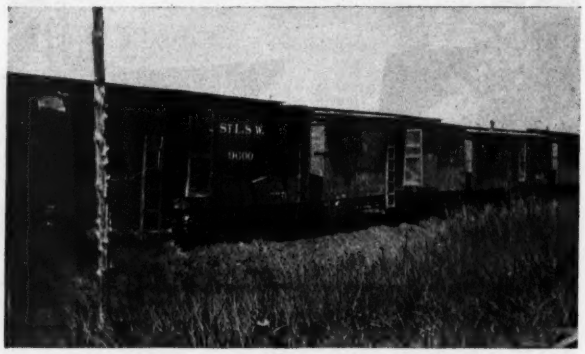
Because of the difficulty in maintaining proper screening, and because of the impossibility of keeping the cars free from mosquitoes with so many men using one doorway, quinine was proposed for the men in Texas during the summer of 1918, under the plan whereby the condition of these men would be compared with that of an equal number of bridge and building men in Arkansas and Missouri who were not given this treatment. The men in 13 gangs in Texas were given quinine capsules, beginning August 20. The capsules were available for all men who wished to use them, with directions to take one capsule after each evening meal. No records were kept, but foremen were visited from time to time and their individual opinions of the value of quinine observed.

As an indication of the effect of the quinine and other control work, one hospital case came from Texas as compared with 14 cases from Arkansas and Missouri during the months June-October, 1918. For the whole bridge and building department there was a decrease of 70.5 per cent in the number of hospital cases for the season of June to October, inclusive, for the year 1918, as compared with the average admissions for the same period during the years 1914 to 1917, or a decrease of 75.0 per cent compared with the average for the same months in 1915 and 1916. A more thorough demonstration of the value of quinine was proposed for 1919. In addition to the Texas bridge and building men, about half of the bridge men in Arkansas and Missouri forces were included in the demonstration.

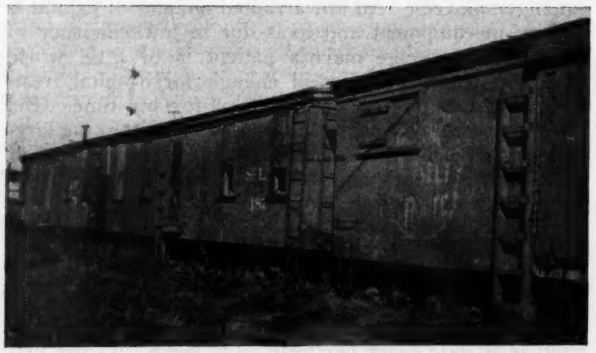
The hospital records for June to October, 1919, show only 14 malaria cases from the entire bridge and building department. This is a reduction of 76.0 per cent compared with the admissions during this same period for the years 1914 to 1916. Where in 1914, 1915 and 1916, one bridge and building man went to the hospital for malarial treatment for approximately every 5,000 man-hours put in by the entire department, in 1920 the ratio had increased to one hospital case for each 32,000 man-hours.

Much Benefit Was Also Effected Among Section Men

During the years 1913 to 1916, section men comprised approximately 18.6 per cent of the total employees of the system and 42.8 per cent of the total malaria patients to the Employees' Hospital. These section men are recruited almost entirely from small towns or from among farmers. The turnover in normal years is large since many of them leave to harvest crops or to obtain the higher wages offered by industrial plants during the busy season of the year, which corresponds to the malarial season. Some of these section men live in houses owned by the railroad, others board or own their own houses.



Poorly Screened Cars Are a Menace to Health



Proper Screening Affords a Very Material Protection

Aside from urging the proper screening of all company houses in 1917 and telling the section men how to protect themselves from the malarial mosquitoes, no steps were taken to reduce the infectivity rate among these men until quinine was adopted in 1919. Because of the fact that conditions under which the section men are obtained and work make them especially subject to climatic changes the comparisons made in the average of hospital admissions for section men should be studied on the

basis of the four-year period 1913 to 1916 and 1917 to 1920. Climatic conditions influencing the country-wide malaria rate were almost identical for these two periods. Considering rainfall and mildness of winter seasons the years 1919 and 1920 were not paralleled in recent times for favorableness to mosquito breeding. In the face of these two very favorable seasons and notwithstanding an increase of about 50 per cent in the number of section men employed as compared with 1916 and the further fact that 1918 itself was especially conducive to a low malarial rate by reason of the unusually dry summer over the entire system, the admission rate to the hospital from section men during 1920 was lower than for the years 1917 and 1918.

It was thought advisable in 1919 to issue quinine to section men over a limited number of miles of railroad. About 200 section men on 233 miles were included. What might be considered the most highly malarial portions of

The Cleaning of Ditches Was an Important Part of the Work

The Way the Ditch Shown Above Looked After Cleaning

the railroad system were chosen for this quinine demonstration. Analysis of data obtained from this demonstration shows positive results, but the number of men involved was so small that no reliable conclusion could be placed on the results. It was, therefore, thought advisable to extend the demonstration to embrace a greater number of men.

Accordingly in 1920 section men over a total of 363 miles, or a total of 53 sections, were offered quinine. While the results of this demonstration were positive, the lack of interest displayed by section foremen in keeping accurate records made it practically impossible to interpret correctly the results obtained. However, an indicated reduction of 38.5 per cent in the admission rate to the hospital for the sections under control was shown.

During the years 1919-1920 accurate records of the use of quinine are available for the section men between Tyler and Lufkin, Texas, a distance of 89 miles. The accompanying table compares two groups of 5 and 10 sections with respect to the proportion of quinine taken, and shows the labor turnover for the years 1919 and 1920 for each group.

COMPARISON OF USE OF QUININE BY SECTION MEN WITH TURNOVER OF LABOR ON SECTION GANGS.

Year 1920	Per cent of Quinine Ration Taken	Total Man Hours Worked	Total Number Men on Rolls	No. of Men Actually Required	Per cent of Turnover
A Sections..	46.9	38,072	161	29	455
B Sections..	96.2	70,302	186	53	251
Year 1919	**Per cent of Quinine Ration Taken**	**Total Man Hours Worked**	**Total Number Men on Rolls**	**No. of Men Actually Required**	**Per cent of Turnover**
A Sections..	31.5	27,921	57	22	159
B Sections..	76.7	55,948	95	43	121

Note—The A sections comprised five gangs, the B sections ten gangs. The men on the A section took less than half of the quinine issued to them, while the men on the B gangs took the greater part of their quinine.

Summarizing the work over the period for all classes, there was a decrease of 1,403 hospital malaria cases during the years 1917-1920, compared with the preceding four years. Using $100 as a conservative estimate of the cost to a railroad of one case of malaria requiring hospital treatment, we have an indicated saving in operating expenses of $140,300 during these four years. If we assume that 100 men on the St. Louis Southwestern Railway were "remade" by completely ridding them of parasites and that these men as a result were returning a fourth more energy in their work, this additional effort would pay twice over the cost of malaria control each year over the entire system.

Water Treating on Missouri Pacific Shows Marked Savings in 1921

AT THE CLOSE of 1921, the yearly statement on water treatment on the Missouri Pacific shows a total of 77 plants in operation, representing a total investment of $310,000. This is an increase of 10 plants during the year, including four continuous type, two intermittent and four soda ash plants, bringing the number of continuous type plants up to 32, of intermittent to 36 and of soda ash to 9. These plants vary in quantity of water treated from a total for the year of less than 5,000,000 gal. in the case of 15 plants, to 210,000,000 gal. with the continuous type plant at North Little Rock, Ark. Except for two of these plants which were not put in operation until the middle of October and a third which was not placed in service until June, practically all of them were in service throughout the year, supplying treated water to the amount of 1,781,560,000 gal. or 34.6 per cent of the total of 5,163,024,000 gal. consumed during the year in making steam.

The average cost of treating water in 1921, according to this report, was 9.8 cents per 1,000 gal. as compared with 8.87 cents in 1920, 8.72 cents in 1919, and 4.71 cents in 1917, this cost including operation, supervision, and ten per cent for depreciation. During the year, 4,916,247 lb. of scale forming matter was removed from the water as a result of treatment. On the basis of a value of 13 cents per pound of scaling matter removed, the gross saving from scale removed alone is $613,964, which, after deducting the cost of treatment, shows a net saving of $443,369 or 143 per cent on the investment in plant.

The report also shows that on the conservative basis of a 5 per cent reduction in the amount of coal required to evaporate the treated water as compared with untreated water; a saving of about 62,000 tons of coal.

Co-operation by Operating Department Helps Maintenance Work

Assistance Rendered In Giving Forces Free Use of the Tracks Will Reduce Cost and Expedite Project

IN THE DAYS when there were only one or two trains in each direction daily, the interference of traffic with maintenance of way operations involving the use of the track was not serious and it was the practice to let the trains over as they arrived. However, as the traffic has increased the inroads upon the time of the maintenance gangs has grown proportionately, until today on many lines the forces cannot work more than half of the time for which they are paid. The effect of this loss of time upon the cost of the work is self-evident. In many places this interference is accepted as a matter of fact. Of late, however, several roads have undertaken to so organize their work in conjunction with that of the transportation department as to reduce this loss. The scheduling of as many trains as possible past the site of the work outside of working hours, the bunching of trains so as to reduce the number of interruptions to the minimum, and the "killing" of one track on a multiple track line, are all expedients to this end.

Because of the importance of this subject to maintenance men we present below two papers on this subject, one by a supervisor on a busy high speed multiple track main line, who views the problem from the standpoint of one who has to do the work, and the second by a division superintendent on an equally important main line, who is charged with responsibility of correlating the work of the maintenance of way and transportation departments.

As a Supervisor Sees It

By J. B. Martin

Supervisor, New York Central, Elkhart, Ind.

A LARGE part of a railroad's revenues are spent on maintenance of way. It is, therefore, important that maintenance methods should have careful consideration to ascertain whether old practices cannot be improved or discarded with profit. One of the large items in maintenance expense is the labor cost of laying rail. A large railroad will lay several hundred miles of new rail in its high speed tracks each year; the rail released is then relaid in freight main and secondary tracks and other rail in yards and sidings. It is fair to assume that for each mile of new rail purchased three miles of rail are handled and laid. The aggregate expense for labor on account of rail renewals is, therefore, very large.

In laying rail the principal interference and delay are due to traffic. This has been given very little consideration in the past. It has long been the almost universal practice to lay the rail under traffic and little or no effort has been made to eliminate the delay and expense due to this feature. It is a well established fact that on important lines the track is free from traffic only about one-half of the time under the most favorable circumstances, and in many instances trains move in such order that the available time between them amounts to less than this.

Many roads now consider the expense of rail renewals so important that where there are multiple tracks they abandon the use of the track to be relaid during the working hours. It can readily be seen what an immense saving this will effect, for it permits placing an organization behind the rail laying gangs to complete the work of spacing, tie renewals, surfacing, etc., while the track is "killed." It is the experience of many men that there is not only a large saving from this practice, but a better quality of work is also secured. This method should commend itself to all maintenance and transportation officers and should be put into effect wherever conditions will permit.

There are some lines where the traffic is too heavy and important to permit the abandoning of the track for this length of time and it is necessary to do the work under traffic, but this does not mean that conditions cannot be improved if the situation is given some study and consideration and the co-operation of the transportation officers is sought. It is considered good operation on some roads to run trains against the current of traffic when this will facilitate the movement. Is there any reason why this cannot be done with some of the trains when laying rail? With the present crossovers and interlocking facilities this can often be done without inconvenience. Full use should be made of all of the facilities.

Certain trains can also frequently be held in terminals without detriment to the service and be bunched and run in groups so as to arrive at the point of the work at one time when there will be less or no interference. It is a frequent complaint that train dispatchers do not give maintenance work as much consideration as they should, but it is well to remember that the dispatcher has his difficulties and the trouble may be found in the system and the policy of the road rather than with the dispatchers. He should give the rail gang accurate information concerning train movements and see that they get the use of the track to the fullest extent. It is obvious that on the busiest lines train interference can be largely reduced by proper arrangements and co-operation. The best results will be obtained by careful planning, good organization and equipment and thorough co-operation between everybody concerned in the maintenance and transportation departments.

The organization should have a sufficient number of men to make the work move with expedition and still not have so many that they cannot be employed profitably when waiting for trains. An important aid in laying rail is the field telephone. With this it is possible to keep in close touch with traffic. It saves long runs to a telegraph office and work can be carried on until a train is close at hand. A motor car should be used for calling in the flagman. It saves time and permits a longer working period.

It is not good practice to stop freight trains and hold them if it can be avoided. This delays both the train and the work. There is the danger of pulling draw bars while heavy freight trains start slowly and use considerable time in passing over the work. Better results will be secured by planning the work so that the trains will move along without stopping.

In a general way these ideas will apply also to ballasting or any other important track work where interference with traffic is to be considered. Careful planning, organization and close co-operation between maintenance and transportation organizations will reduce the cost.

A few hundred hours of labor saved on each mile of rail or ballasting will, in the aggregate, produce a very large saving on the railroad.

Division Control Promotes Economy

By F. M. Barker

Division Superintendent, Lehigh Valley, Buffalo, N. Y.

THE LEHIGH VALLEY operates under divisional plan, the superintendent being in direct charge of all departments. It therefore necessarily follows that he is anxious to co-ordinate the work in all of the different departments so as to get the best results at the least expense. The division of which I have charge has a plan whereby the division staff (division engineer, master mechanic, train master and chief despatcher) get together every Monday morning, to plan for the work of the week. Frequently short staff meetings are also held during the week for the purpose of discussing any special features which may come up.

In laying rail a usual day's work for us is from three to four miles. Before starting the work the superintendent calls the heads of the departments together, goes over all details, satisfies himself that all necessary preparations have been made, and issues instructions to give the maintenance of way forces all possible assistance. All rail, spikes, tie plates and other fastening together with frogs and switches, are gotten in the territory and distributed on the ground, all measurements are made, and an organization is perfected, and so balanced that every unit is properly in place, the operation moving like a machine, with one gang crowding the other. The result is that at the close-up of the work the track is entirely clear, and complete in every single detail, after the last man passes over.

Usually the traffic is diverted to another track so that the men are not interfered with during the day. The despatching of trains, boarding out of terminals, etc., is adjusted so as to eliminate as much serious detention to traffic as possible during the time the rail is being laid, or when single track is being operated. Under such conditions, an operating officer (generally the train master) is detailed to go on the ground, supervise the train movements, and work in conjunction with the train dispatchers.

With such an arrangement, all concerned are alive to the situation, and keyed up to conduct the movement of trains so as to avoid any delay to traffic. The most important feature of such an organization, however, is that this co-operation allows every detail of the work to be arranged for minutely in advance. In an operation of this kind, when the track is turned over to the maintenance of way forces, and when these forces, men as well as materials, are organized efficiently and distributed judiciously, and mechanical power such as locomotive cranes, air drilling machines, etc., is used, it is our experience that as much work can be accomplished in a few hours as could otherwise be performed in a week or ten days if done by hand and under traffic.

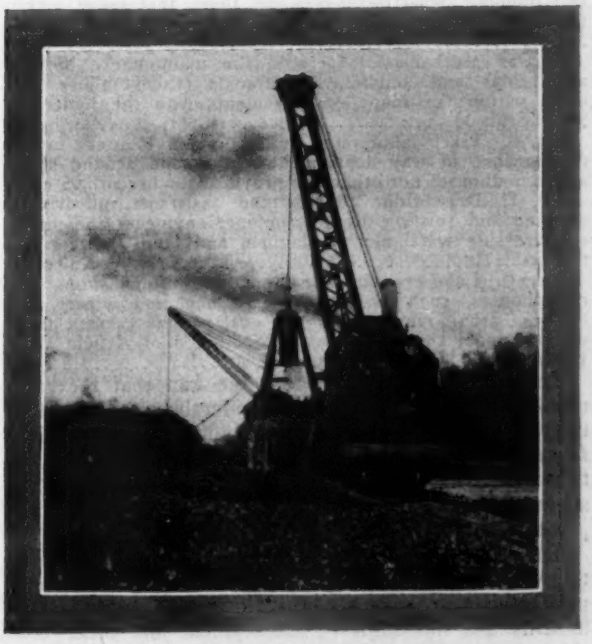
The same co-operation also applies to all other departments in the case of emergencies such as storms, etc. As all divisional forces are under the superintendent, the maintenance of way men turn in to assist the maintenance of equipment or transportation departments in the unloading of fuel, enginehouse work, or in any other way to keep the operations going right and efficiently.

With such an organization, the departmental idea is practically eliminated. The division engineer, train master, master mechanic, and other division officers are interested in the division as a whole, and have their eyes open to see and correct irregularities in all departments, regardless of whether they happen to be their own or not. In other words, the staff functions from the superintendent who is responsible and who receives credit for the success of the entire operation and maintenance of the division.

In my judgment, the best feature of such a plan is the economy resulting, for under such an arrangement each department carries the minimum number of men to operate, without top-heavy forces for emergencies, which can be met by throwing in men from other departments to take care of them. This cannot be accomplished unless the superintendent is in complete charge of the division.

Flowers as a Problem In Bridge Maintenance

ONE OF THE most unusual problems confronting bridge maintenance forces is that encountered on the Southern Pacific Lines between Lafayette, La., and Baton Rouge. Water hyacinths, a flowering plant of the same general type as that commonly found in gardens, grow in great abundance in the bayous adjoining the railroads and during high water they cause a great deal of trouble by floating with the current and banking up in a solid mass several feet deep against the upstream



Picking Flowers With a Clam Shell

sides of railway trestles crossing these bayous. There they form a dam which interferes seriously with the flow of the water.

The most practical method which has been discovered for dealing with this problem has been to run locomotive cranes unto these trestles equipped with clam shell buckets fitted with teeth. With this equipment the hyacinths are readily picked up, transferred across the track and dumped into the water on the downstream side where they float away. The cranes can handle an enormous quantity of this material in a day and will remove the obstruction much more quickly and economically than can be done in any other way.

Labor Board Approves Wage Reduction

Cuts of One to Five Cents Per Hour Effective July 1—Decision Also Issued in Contract Cases

AS WE GO to press the Railroad Labor Board has rendered a decision, dated May 28, 1922, authorizing a reduction in the wages of maintenance of way employees ranging from one cent to five cents per hour. It covers practically all employees of the department from the ranks of laborer to bridge and building, painter and other foremen of skilled trades. The reduction is effective July 1, 1922. The decision as to reduction in wages is as follows, the various statements indicating the reduction in the rate per hour:

Sec. 1. Bridge, building, painter, construction, mason and concrete, water supply and plumber foremen (except water supply and plumber foremen coming under the provisions of Section 1 of Article IV, Decision 147).....5 cents

Sec. 2. Assistant bridge, building, painter, construction, mason and concrete, water supply and plumber foremen, and for coal wharf, coal chute and fence gang foremen, piledriver, ditching and hoisting engineers and bridge inspectors (except assistant water supply and plumber foremen coming under the provisions of Section 1 of Article IV, Decision No. 147).....5 cents

Sec. 3. Section, track and maintenance foremen and assistant section, track and maintenance foremen.....3 cents

Sec. 4. Mechanics in the maintenance of way and bridge and building departments (except those that come within the scope of agreements with the Federated Shop Crafts).....4 cents

Sec. 5. Mechanics' helpers in the maintenance of way and bridge and building departments (except those that come within the scope of agreements with the Federated Shop Crafts).....1 cent

Sec. 6. Track laborers and all common laborers in the maintenance of way department and in and around shops and roundhouses not otherwise provided for herein...5 cents

Sec. 7. Drawbridge tenders and assistants, piledrivers, ditching and hoisting firemen, pumper engineers and pumpers, crossing watchmen or flagmen and lamp lighters and tenders.....5 cents

Sec. 8. Laborers employed in and around shops and roundhouses, such as engine watchmen and wipers, fire builders, ashpit men, flue borers, coal passers (except those coming under the provisions of Section 3 of Article VIII, Decision No. 147), coal chute men, etc.....5 cents

The board calls attention to the fact that the rates now in effect are subject to considerable variation, that the rates of track laborers, for instance, range at present from 28 cents to 40 cents per hour. The new rates authorized by the decision will be obtained in all cases by subtracting the authorized reduction per hour from the present hourly rate.

The board states in the decision that, in its opinion, the wages as reduced will still be in excess of those paid to similar labor in other industries and that the hazards and hardships of employment and other considerations warrant the payment of better wages than those in outside employment. The board also expressed lack of sympathy in the idea that it should be controlled in this decision by a consideration of the fact that low wages may be paid to other labor in a period of temporary depression and unemployment.

That the board has been governed in its decision by a study of cost of living and purchasing power in relation to wages is evidenced by a statement contained in the decision showing ranges in wage rates and index prices for the cost of living, together with a calculated per cent of increase in the purchasing power of the earnings. This is foundation for the statement that common labor under the present decision will receive an average wage of 32.7 cents, which is an increase of 69.4 per cent over the rate paid in December, 1917. The increase in the cost of living in March, 1922, over December, 1917, is given as 17.2 per cent, therefore, under the present decision it is estimated that the purchasing power of the common laborer is 44.5 per cent greater than in December, 1917.

The decision of the board with respect to the wage reductions as outlined in the specific paragraphs given above are effective on these roads and with respect to those particular classes of employees that were specifically named in the documents filed with the board by the various railroads when this case was taken up. The decision includes a long list of railroads, indicating in each case what classes of employees are affected:

Sec. 1. The provisions of this decision will not apply in cases where amounts less than $30 per month are paid to individuals for special service which takes only a part of their time from outside employment or business.

Sec. 2. Decreases specified in this decision are to be deducted on the following basis:

(a) For employees paid by the hour, deduct the hourly decrease from the hourly rate.

(b) For employees paid by the day deduct eight times the hourly decrease from the daily rate.

(c) For employees paid by the month deduct 204 times the hourly decrease from the monthly rate.

Dissenting Opinion

Appended to the decision as given out by the board is a minority report of considerable length signed by the three members of the employees' group of the board, A. O. Wharton, Albert Phillips and W. L. McMenimen, setting forth why they "are unable to concur in the decision fixing a further reduction in the basic minimum rates of pay in the transportation industry."

Their reasons for this dissenting opinion are as follows:

(1) The rates of pay established under this decision as the basis minimum rates of the transportation industry will merely perpetuate the low level of purchasing power possessed by this large class of workers in pre-war years. The opinion expressed in the majority decision, that "The Board is not in sympathy with the idea that a governmental tribunal, empowered to fix a just and reasonable wage for men engaged in serving the public in the transportation industry, should be controlled by the one consideration of the low wage that may be paid to other labor," would seem to indicate a feeling that the decision would not perpetuate the injustices of a former unregulated period. Below we show clearly the fallacies of attempting to show that the rates of the decision will mean increased purchasing power over pre-war levels.

(2) The rates of pay established under this decision will mean annual earnings far below any minimum standard of subsistance which has been formulated, even below those of most conservative employer groups.

(3) The rates of pay established under this decision are not based upon the human needs of the hundreds of thousands of families involved. They are insufficient to provide these families with the absolute essentials. The earnings of this large group of railroad employees will not provide the father of a family with as much food as is allowed convicts in the Cook County, Illinois, jail.

(4) The per-war standard perpetuated by this decision was the product of inequitable wage bargains. It was considerably below the level recognized at that time as necessary for the maintenance of health and energy.

Following the publication of the Labor Board's decision, E. F. Grable, president of the Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, authorized a strike referendum. This, of course,

will take some time and it will be more than a month before any action could be taken. Threats of a strike have also been made by B. M. Jewell, president of the railway employees' department of the American Federation of Labor, because of a wage reduction decision effecting the shop crafts which is expected shortly.

Board Issues Decision in Contract Case

On May 10, the United States Railroad Labor Board handed down a decision in what is undoubtedly one of the most important cases that has come before it up to this time. In the words of the board, "It goes to the vitals of the Transportation Act."

Briefly, the decision of the board is that the contracts for the operation of the Indiana Harbor Belt car repair shops are in violation of the Transportation Act, and that the shop employees of the contractor are under the jurisdiction of the Labor Board and subject to the application of the Transportation Act, and decision No. 147. In making this decision, the Labor Board states that "this decision rests on the fact of this particular case and the decision of each of the other contract cases pending before the Labor Board will rest upon its own facts and the general principles herein declared."

Contracting of Maintenance Work Growing

While the controversy which gave rise to this decision resulted from the contracting of shop work, the principles laid down by the board in this decision will be of interest to maintenance officers who have given increased attention in recent months to the possibilities of contracting all or a portion of their operations, some roads having followed this practice for such work as rail laying and ballasting for a considerable number of years. The work which has been contracted has been largely of the classes which can be measured readily, although in a few instances all maintenance work has been turned over to the contractor on a force account basis.

The practice most generally favored by those roads which have considered handling work by contract has been to award contracts on the basis of unit prices for specific work, although in a number of instances the difficulty in determining a fair price because of traffic or other variable conditions has led to the doing of work on the basis of cost plus a fixed percentage and one road is now arranging to contract the laying of approximately 25,000 tons of rail on the basis of cost plus a variable fee, the fee to be the maximum when the cost is the minimum and vice versa. Still another road has contracted a large amount of its work to its maintenance employees on a piece work basis, much after the manner of station work in railway construction.

In so far as the quality of the work is concerned, one large road which has contracted the laying of rail and the ballasting of track, has found that work can be done as well by contract as by company forces at a saving of at least 25 per cent, while it has been the experience of another road that better work was secured from the contractor at a cost of about 80 per cent of that done by company forces. Another road which has contracted the laying of rail, the cleaning of ditches and the clearing of the right of way on a unit price basis reports results equal to those obtained with company forces and at a smaller cost. On the other hand, another road which has contracted much ballasting and rail relaying has encountered difficulty in securing the proper quality of work.

There is a wide divergence of opinion regarding the possibility of extending contract work to cover all maintenance operations. The chief engineer of one road which has gone into the contracting of rail laying and ballasting extensively states that it is entirely practical to contract all work that is done with extra gangs, but limits it to this. The chief engineer of another road which has done much contracting states that "we have never undertaken to handle general track maintenance by contract, although it is undoubtedly practicable to do this." In marked contrast with this, another chief engineer states that, "Under normal conditions I see no advantage and in fact I see quite a distinct disadvantage in contracting maintenance work, unless it can be done on a bona fide unit price basis. The nature of maintenance work makes such a basis rather difficult of adoption, unless it is confined to some of the more distinctive operations, such as the laying of rail and ballasting."

The Indiana Harbor Belt Decision

The facts with respect to the Indiana Harbor Belt case date back to Januarv 1, 1921, when, for about four months, the road posted notices at intervals in its various shops and car repair yards, notifying employees that the operation of these shops and yards would be discontinued by the railroad company and the work turned over to a contractor. In general, the provisions of these contracts were that the contractor employed the men on a force account basis and was paid by the railroad company upon the presentation of payrolls, his own compensation being a percentage ranging from 5 to 12 per cent of the bill for labor. The railroad company supplied the materials and the work was supervised by the railroad's foremen. The opinion of the Labor Board is as follows:

Opinion

The board is of opinion that the employees failed to substantiate their contention that the contracts are actually fraudulent, and that they are mere subterfuges contrived to evade the Transportation Act. Obviously they do evade the act, but the carrier contends that it is a lawful evasion.

This contract system is not an innovation recently born of the desire to circumvent the Transportation Act. It existed long before the Transportation Act was ever dreamed of. In fact, it was practiced as far back as 1855 on the Philadelphia, Wilmington & Baltimore Railroad and it is pertinent to note that the actual operation of the trains on this road was let by contract.

This leads up to the remaining and principal issue in this case—namely, had the carrier the right to enter into such contracts as takes this class of employees from under the application of the Transportation Act and the jurisdiction of the Railroad Labor Board?

No more important dispute has ever come before the Labor Board for adjudication. It goes to the vitals of the Transportation Act. If the carrier can legally do the thing which has been done under these contracts, then the entire Transportation Act can be nullified and the will of the Congress of the United States set at naught.

Contracts have been recently entered into by various carriers, purporting to turn over to so-called independent contractors the work of the following classes of employees: (1) The six shop crafts, (2) the maintenance of way employees (3) certain employees embraced in the clerks' organization, (4) the firemen and oilers, (5) the hostlers embraced in the engine service, and (6) signal department employees.

The object of the Transportation Act was to prevent interruption to traffic, growing out of disputes between carriers and their employees. In the Transportation Act, 1920, the government enjoins upon all carriers, and their officers, employees and agents the duty to "exert every reasonable effort and adopt every available means to avoid any interruption to the operation of any carrier, growing out of any dispute between the carrier and the employees or subordinate officials thereof." Elaborate provisions are made in this act for conferences between the parties for the settlement of disputes and, in the event of a failure to agree, for the hearing and decision of them by adjustment boards and by the Railroad Labor Board.

When Congress in this act speaks of railroad employees, it undoubtedly contemplates those engaged in the customary work directly contributory to the operation of the railroads. It is absurd to say that carriers and their employees would not be permitted to interrupt commerce by labor controversies unless the operation of the roads was turned over to contractors, in which event the so-called contractors and the railway workers might engage in industrial warfare ad libitum. A strike by the employees of a contractor or contractor-agent of a carrier would as effectually result in an interruption to traffic as if the men were the direct employees of the carrier.

To the outside observer, and so far as the public is concerned, the car repair department of this carrier has undergone no real change. There need be no misunderstanding of this situation. The contractor performs only one useful function in this operation—he is the medium or channel through which the piece-work system was substituted for the lawfully established wage scale. The contractor's compensation for this is five per cent of the amount of the payroll, and the rate of pay is carefully limited by the piece-work provisions in the contract. The contractor takes absolutely no risk.

It may seem immaterial to the public what method or arrangement the carrier adopts to secure the performance of the work essential to its operation. But it is immensely important to the public that this work be carried on in a peaceful and orderly manner. It may seem immaterial to the public for the carrier to contract any of its work. But it is important if by such contract the carrier seeks to remove its employees from under the application of a law which the people have enacted for the purpose of maintaining industrial peace on the railways. There is a public interest in the carrier's methods greater than may appear on the surface. The contracts herein involved violate the spirit and purpose of the Transportation Act, and in effect set aside the wage decisions of the Railroad Labor Board to which the carrier was a party and which the carrier put into effect.

The board can understand how the carrier reached the conclusion that it had the right to make such contracts because somewhat similar ones had been made through a long course of years; but those precedents have been robbed of their potency by the enactment of the Transportation Act, which the courts of the country, without exception so far, have declared to be constitutional.

Decision

The Railroad Labor Board therefore decides:

(1) That the various contracts entered into between the Indiana Harbor Belt Railroad Company and the Burnham Car Repair Company for the operation of its railway shops and particularly the one bearing date of September 16, 1921, are in violation of the Transportation Act, insofar as they purport or are construed by the carrier to remove said employees from the application of said act, and that those provisions of the contracts affecting the wages and working rules of said employees are in violation of Decisions Nos. 2, 119 and 147 of the Railroad Labor Board.

(2) That the shop employees of said contractor are under the jurisdiction of the Railroad Labor Board and subject to the application of the Transportation Act, 1920, and Decision No. 147.

(3) The carrier is directed to take up with any employee the matter of reinstatement upon the application of the interested employee or his representative.

Decisions in Minor Cases

The Management Is the Judge of Qualifications

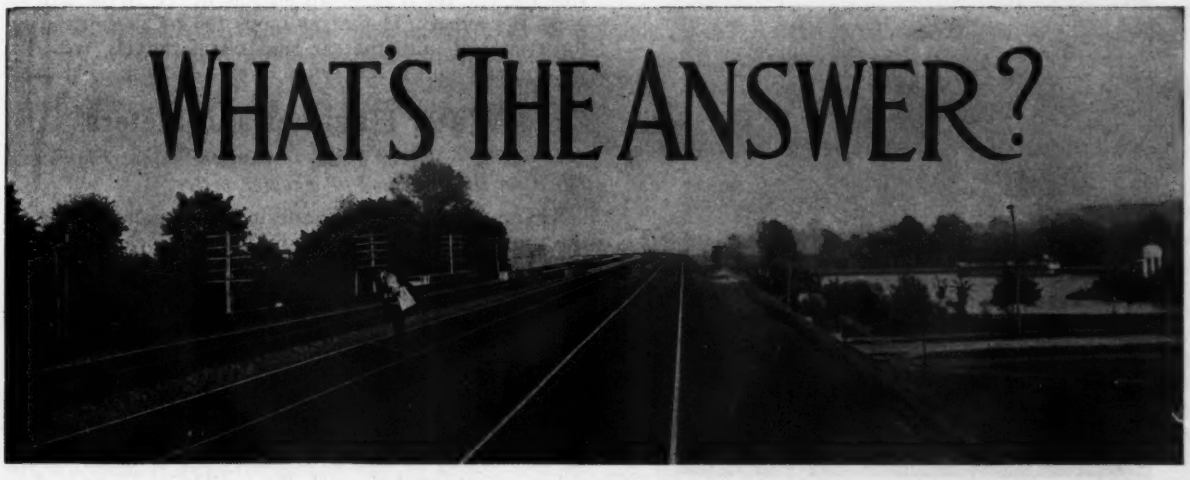
The United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers submitted a case to the Labor Board regarding four carpenters on the Delaware, Lackawanna & Western who, it was shown, were laid off on account of a reduction in force, while men younger in the service were retained. The railroad claimed that the men laid off did not have the qualifications necessary to perform high grade carpenter work in an efficient manner within reasonable time and that the agreement specifies that the railroad is the judge as to whether the efficiency of the men is satisfactory. The Labor Board sustained the railroad, stating that the language of the agreement definitely leaves the matter of efficiency largely in the hands of the carrier. (Decision No. 807.)

No Overtime for Emergency Work by Watchman

A crossing watchman on the Atchison, Topeka & Santa Fe was employed on a monthly salary based on an eight hour day. During an emergency for a period of six days he was required to work three hours extra on verbal instructions received from the station agent. He received no additional compensation for this work and entered a claim for overtime under section A-12 of the agreement which specifies that overtime shall be paid on the hourly basis for the ninth and tenth hours and time and one-half for hours in excess of ten. The decision of the board was that this clause was not intended to cover temporary assignments of monthly paid employees for emergency purposes and decided that the watchman was not entitled to extra compensation for his work. This ruling, however, is not intended to permit the assignment of employees to overtime work for any considerable period without payment of overtime. (Decision No. 808.)

Seniority Requirements Must Be Fulfilled

A track laborer on the Buffalo, Rochester & Pittsburgh made a presentation to the Labor Board because he was not promoted to section foreman. This man had previously served in this position temporarily during the absence of the foreman, but the position of temporary foreman on the same section for the summer season was given to another man. The contention of the railroad for not giving him the position was that he failed to bid for the position when it was advertised and that he had left the service for a time previously, so that he was only in the service continuously for seven weeks and six days at the time the vacancy was filled and that he was not considered competent to handle the position of foreman for a continuous period. The board sustained the position of the railroad, particularly with respect to the fact that six months' employment is required to establish seniority rights. (Decision No. 809.)



This department is an open forum for the discussion of practical problems of maintenance of way and structures. Readers are urged to send in any questions which arise in their work in the maintenance of tracks, bridges, buildings and water service. The *Railway Maintenance Engineer* also solicits the co-operation of its readers in answering any of the questions listed below.

The following questions will be answered in next month's issue:

(1) *Does the treating of boiler water render it unfit to drink?*
(2) *Can a man be poisoned in handling creosoted timbers?*
(3) *How many pounds in a ton of rail, and in a ton of tie plates?*
(4) *How is the distance between points of frogs in crossovers determined?*
(5) *What is the best method of protecting the intake of a pumping plant taking water from a stream or reservoir to keep out drift or other floating matter?*
(6) *Is digging the only way to get dandelions out of a station grounds lawn?*
(7) *What causes "alligatoring" of a paint surface?*
(8) *Is there any objection to the heating of reinforcing bars for the purpose of making bends?*

Piped Rails and Split Head Rails

What are the indications of a piped rail and how does it differ from a split head rail?

First Answer

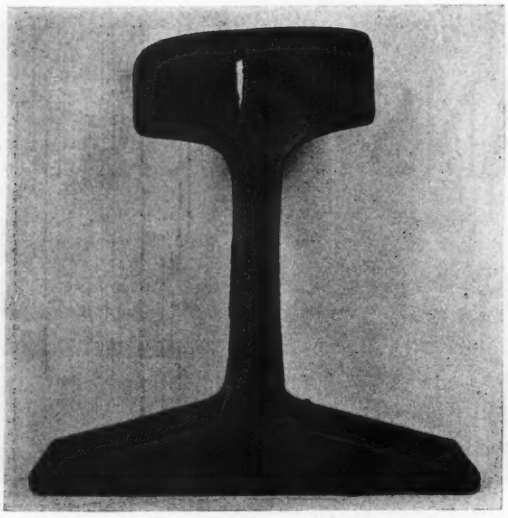
For some reason a serious misunderstanding has developed as to the meaning of the term "piped rail" so that this term as used by the employees of the rail mills means something entirely different from what is commonly meant by this term as used by maintenance of way men. Apparently many railway men are under the impression that a rail with a hole in it is a piped rail. This is not the case from the standpoint of either theoretical or practical reasoning. The fundamental fact to bear in mind is that the ingot or casting from which rails are rolled contains a depression or cavity in the center that is formed by the shrinkage of the metal as it cools, a perfectly normal and natural process. The remains of this cavity in the ingot, when rolled out, produce a longitudinal lamination or enclosed crack in the center of the rail section, usually almost exactly in the center of the web. Because the pipe in the ingot contains gasses, the process of rolling is not effective in welding together the two surfaces of this cavity. Consequently, when a rail containing a pipe is broken it shows a vertical split in the center of the web which may even extend part way into the head or the base. This is a pipe and when a rail containing such a pipe is split apart, it will be found that the sides of this split or crease are perfectly smooth like the surface of rolled steel but of light color as shown in the photograph. In other words, it has an appearance that shows clearly that the two sides of the metal were never joined.

A split head always has its origin in the head, where for various reasons the metal is unable to resist the traffic strain, with the result that the two sides of the head are pulled apart with the formation of a fracture. This

The Flaw in a Piped Rail Has a Smooth, Glossy Surface

grows rapidly and causes a distinct longitudinal separation of the metal in the head. The sides of this cavity will be found to be crystalline in character, indicating that a fracture actually took place.

If the pipe contains some foreign matter, such as slag, it may possibly extend into the head and cause a splitting that in some ways may resemble a split head. However,



A Split Head Rail

this can be distinguished as a pipe by the fact that the surfaces of the crack will appear smooth and not crystalline. A split head can also be identified by widening of the head and the tightening of the angle bar fit.

C. W. GENNET, JR.,
Manager, Rail Inspection Dept., Robt. W. Hunt & Co., Chicago.

Second Answer

Piped rails result from the presence in the rail of the unwelded surface of an original cavity (called a pipe) in the ingot, but very few failures are traceable to this cause. Split heads or crushed heads are frequently termed piped rails, which is a misuse of the term pipe. The means of differentiating between piped rails and split heads is in the location of the opening in the rail. The opening of a split head is generally confined to the head, while a true piped rail is located in the web, extending very little into the head. In rare cases, a split head rail may be found running into a pipe. It is an easy matter to detect a crushed or split head rail, for the widening of the head is very apparent in most cases; also a dark streak appears in the center of the top of the head of the crushed portion, which indicates that a portion of the metal is depressed. Therefore, it is not kept brightened by the passing wheels. There is also the appearance of a streak of rust under the head before the rail cracks or breaks. This type of failure can be detected readily in its early development and it also forms very slowly in service.

J. W. POWERS,
Supervisor, New York Central, Rochester, N. Y.

Adjustment of a Speeder Wheel

What is the best way to set or adjust the third wheel on a railway speeder to insure proper running?

In answer to this question it is understood that the term railway speeder applies to the common three-wheel, hand-operated car. Before starting to adjust the third wheel be sure that the rear or drive wheel is lined up parallel with the frame of the car. The front wheel should be cramped slightly so that is tends to run toward the rail, that is, the front edge of the rim should be set about ⅛ in. closer to the car frame than the rear edge. Adjust the cross brace to the little wheel so as to allow about 2 in. play short of the gage of the track. Then turn the front edge of the little wheel about 1 in. out of parallel with the rail, so that as the car is operated this wheel will tend to keep the car on the running rail. Now ride the car for 6 or 8 rail lengths to see if the adjustment is correct. If the car binds too much ease up on the cramping until the car runs comparatively free and yet will stay on the track on curves. SIGNAL MAN.

Water Hammer and Meters

Does chattering of a faucet or water hammer have any effect on the accuracy of a water meter?

The answer is no. "Chattering" is usually caused by the vibration of loose or worn fixtures or valve parts. "Water hammer" or "hydraulic shock" is caused by the sudden stoppage of the flow of water through its conductor, and its only effect is to increase or decrease the volume, depending upon the shock pressure and whether the pressure wave is advancing or receding.

Meters accomplish measurement by displacement, or in some types by the movement of a re-action wheel designed to revolve with the current at a speed proportional to the velocity of the flow. They are actuated by the volume discharged through them. Their accuracy does not depend upon, nor is it affected by, high pressure conditions or changes. H. F. BROWN,
Western Manager, Neptune Meter Company, Chicago.

Causes of Rail Wear on Curves

What are the three most important causes of the wear of rails on the high side of curves?

First Answer

The high or lead rail receives the side pressure of every wheel on that side of a train as the truck tends to go straight, and in this way produces a heavy friction against the gage side of the high rail which causes the wear. Too little elevation for the speed of the train on a curve will result in extra heavy wear of the gage side of the outer rail. Irregular line and surface will result in the wear of the gage side of the outer rail in an irregular manner with the variations in line and surface.

J. MORGAN,
Supervisor, Central of Georgia, Leeds, Ala.

Second Answer

(1) Irregular surface will cause the high rail on curves to wear with the sidewise movement from the high side of the curve to the low side. (2) Irregular line will also cause unnecessary wear of rails on the high sides of curves. (3) If a curve laid to standard gage is allowed to run wider than 4 ft. 8½ in., I find it causes the rails on the high side of the curve to wear excessively. As the car or engine passes from the point where the gage is standard to where it is wider, it causes the equipment to swing to the high side of the curve. This causes unnecessary wear of rails.

M. L. WHEATLEY,
Extra Gang Foreman, Illinois Central, Millwood, Ky.

The Effect of Air on the Suction of a Pump

How Does Air in Water Affect the Capacity of a Pump with a Suction Lift?

An answer to this question has been given by "Power" as follows: Water under atmospheric conditions contains about two per cent of air in solution, and when the pressure is reduced, as by partial vacuum in a pump suction, this air will expand. Under a suction lift of 17 ft. the initial two per cent of air will expand to four per cent and with a suction lift of 28 ft., which is equivalent to an absolute pressure of 6 ft. of water, the original two per cent of air will expand to 34 divided by 6 times 2 equals 11.3

per cent. (The volume of the air is inversely proportional to the absolute pressures.) The air then would fill 11.3 per cent of the water cylinder with a corresponding reduction of pumping capacity. The reduction of capacity usually is not as much as this in practice because the water passes so quickly through suction pipes of ordinary lengths that there is not sufficient time for the air to be liberated.

Shortening the Time of Setting

Can soda ash or washing soda be used for reducing the time of setting of concrete? What proportions should be used?

Tests to determine the effect of sodium carbonate have been made at the Structural Materials Research Laboratory at Lewis Institute, Chicago, under the direction of Prof. Duff A. Abrams. These tests indicate that sodium carbonate mixed in the proportion of 2 per cent by weight of the cement reduces the setting time to 33 per cent of the original, while the addition of 3 per cent of sodium carbonate reduces the setting time to 23 per cent of the original. Two per cent of calcium chloride reduces the setting time to 33 per cent, and 4 per cent reduces it to 16 per cent of the original.

The exact quantity to be used in a concrete mixture will depend somewhat upon the composition of the commercial materials available and on the characteristics of the particular cement, temperature conditions, quantity of mixing water used and other factors. Therefore, it will be necessary to make a few trials with these materials before the quantity necessary can be determined exactly.

J. E. FREEMAN,
National Concrete Specialties Company, Chicago.

Cleaning Pressed Brick

What is the best method of cleaning exterior pressed brick walls to remove grime as well as pencil marks, chalk marks, etc?

The least expensive method is to wash the surface with a solution of muriatic acid (commercial hydrochloric acid). The strength of the solution varies from 10 to 25 per cent and should not be used any stronger than necessary to accomplish the results. If a strong solution is used on a light colored brick it may possibly stain the surface. The acid solution should be applied with a brisk rubbing with a scrubbing brush or stiff bristle brush, taking care to rinse off the surface with clear water as quickly as possible, since the absorbent properties of the pressed brick will tend to soak up the muriatic acid together with the grime which it has loosened.

If this process does not serve to clean the brick, it will be necessary to supplement the acid treatment with a brisk rubbing with a carborundum brick and if this does not suffice, there is still recourse to the sand blast, which is an effective though somewhat expensive process.

Keeping Locomotives Off the Live Rail

What is the best method of preventing switchmen from running locomotives over the live rail of the track scale?

This would seem to be a problem outside the province of the maintenance of way department. The maintenance officer who has this objectionable practice brought to his notice should call it to the attention of the operating department. The posting of signs near track scales, the issuing of bulletins and disciplinary measures would seem to be all that can be done. Perhaps a more satisfactory solution is to improve the standard of track scale design so that operation over them of at least the locomotives in switching service would not be objectionable. The general improvement in track scale designing methods which has taken place during the last 10 years is a tendency in the right direction.

Further Answers to Old Questions

The following are comments on and supplementary answers to questions previously answered:

Loam and Clay in Sand

Edgar E. Enney of Youngstown, Ohio, suggests that the best way of determining the effect of loam or clay in sand is to make briquettes which can be stored a sufficient time to develop facts concerning both the strength of the mortar and its soundness. Standard tests for determining strength and soundness may be had from any text book on concrete. This is, of course, the best method if sufficient time is available to wait for the results of such tests.

Cutting Rail

J. Morgan, supervisor, Central of Georgia, calls attention to the fact that a letter to the editor which appeared over his signature in the *Railway Maintenance Engineer* for May, 1921, contained a detailed description of a method for breaking rails with a slight cut on the edges of the base. Mr. Morgan states that according to his method the work can be done very readily by 5 or 6 men and does not require as many as 12 men as suggested by V. H. Shore in the May issue, page 177.

Keeping Short Line Kinks Out of Short Ballasted Tracks

The requisites for success in solving this problem are as follows: A heavy shoulder at the ends of the ties, good surface, spikes driven down tight, enough rail anchors to keep the track from buckling, uniform expansion and solid ties.

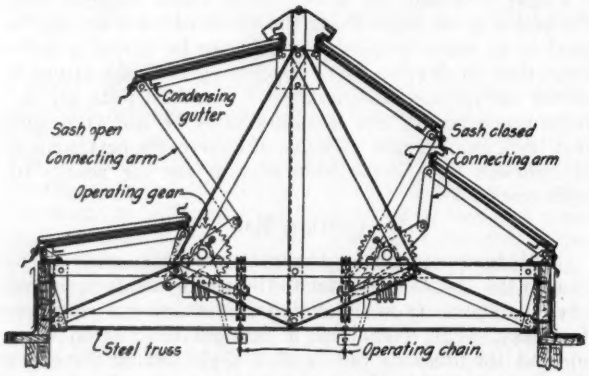
R. ROSSI,
Section Foreman, Belt Railway of Chicago.

The New 540-ft. Cantilever Bridge Over the St. John River in New Brunswick

NEW DEVICES

A Ventilating Skylight

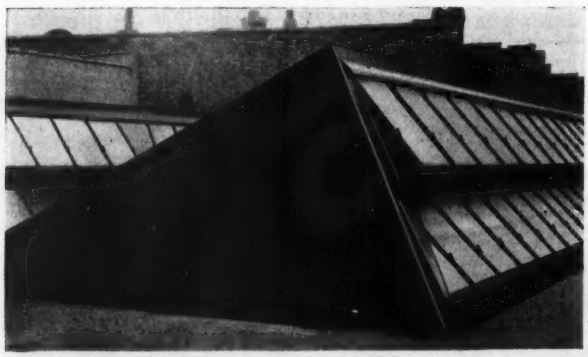
A SKYLIGHT provided with swinging sash that can be opened for ventilating, yet designed to be thoroughly weatherproof, is one of the newest developments for application to both new and old buildings. The distinctive feature of this construction is a balancing arrangement whereby the two sash are in equilibrium in all positions, thus making for ease of manipulation, while the use of a screw drive insures against change



One Side of the Skylight May Be Opened While the Other Is Closed

of position of the sash through the effect of wind pressure or any other influence on the sash.

The construction is readily understood from an examination of the diagram. Each side of the skylight is sub-divided into two sashes, the upper one pivoted at the top and the lower one at the bottom, the free ends of the sashes being connected by links to a double crank attached to the shaft of a worm type operating gear.



Ventilating Skylights As Applied to Saw-tooth Construction

Both the sashes and operating gear are supported on a light galvanized steel truss construction provided with hangers suitable for support of the structure from the skylight curb. Effective flashing is provided at the top, at the junction of the upper and lower sashes and at the hinges of the lower sash so that the skylight is thoroughly weatherproof in any position of the sash.

The skylights are made up in standard sizes with spans of 6, 8, 10 and 12 ft., measured face to face of curbs, and can be obtained in any lengths desired. The trusses are shipped assembled with the operating levers and links attached. As a consequence, the assembling of the skylight may be accomplished with the aid of any handy man. The same principle of balanced sash is also applied to saw tooth construction as shown in the photograph. This balanced sash as applied to skylights or any other construction is known as the Blaski ventilating skylight and has been placed on the market by McKeown Brothers Company, Inc., Chicago.

A New Development in Shingles

"AN IMPROVED all-mineral form of the flexible slate surfaced shingle" is the way Johns-Manbille, Inc., New York, refers to a newly developed shingle which it has recently added to its line of roofing materials adapted to railway service. The product is called the Johns-Manville Flexible Asbestos Shingle and, as the name implies, it is primarily an asbestos product. As such it has features in common with other shingles of the same general class but it is of interest particularly in the fact that it represents somewhat of a new departure in asbestos shingle manufacture.

Flextone Shingle

The distinction arises in the use of a felt base consisting entirely of a fabric of asbestos fibre instead of a base made of rags, jute, waste paper or other material compounded together and impregnated with asphalt. In support of this method of manufacture, it is said that the finished product is capable of a longer and more economical service and affords a greater degree of protection from fire. As the all-asbestos felt is fire-proof itself and immune from rot, it is said to afford the additional advantage of eliminating the need of relying upon the slate surfacing for more than its attractive appearance.

American Railway Engineering Association

The Board of Directors will meet with the committees on Outline of Work, on Personnel of Committees, and on Standardization, in Chicago on June 12, and will convene in executive session on June 13. Practically all of the standing committees of the association have organized their work for the year and 12 of the committees have already held meetings.

Bridge and Building Association

Tentative reports from six of the eight committees will be completed and in the hands of the secretary by June 15, and it is expected that these reports will be ready for delivery to the printers in final form prior to August 1. The total membership of the association has now reached 866 and it is expected that the drive which is now under way will increase this to over 1,000 before the convention next October.

Roadmasters' Association

The executive committee and the chairmen of other committees of the Roadmasters and Maintenance of Way Association will meet at the Hotel Statler, Cleveland, on Saturday, July 8, to plan for the September convention.

Metropolitan Track Supervisors' Club

The next meeting of the Metropolitan Track Supervisors' Club will be held on June 10. The discussion of rail laying and its cost, which was opened at the last meeting, will be the principal subject of discussion at the June meeting.

International Track Supervisors' Club

The next meeting of the International Track Supervisors' Club will be held at the Statler hotel, Buffalo, N. Y., on June 16. This will be the annual business meeting at which time officers for the ensuing year will be elected. The program will also include the discussion of a paper on the making of section foremen which was delivered at the last meeting held on April 20, by J. H. Lynch, supervisor, on the Erie at Buffalo. Arrangements are also being made for a trip to the plant of the General Stone Crusher Company at Akron, N. Y. Owing to the large amount of interest manifested in Mr. Lynch's paper at the April meeting, a lively discussion at the June meeting is anticipated.

Maintenance of Way Club of Chicago

Rail Failures, What They Are and How to Identify Them, will be the subject of a talk to be given at the next meeting of the Maintenance of Way Club of Chicago, at the Auditorium hotel, on Wednesday, June 21. The speaker will be C. W. Gennet, Jr., manager of the rail inspection department of Robert W. Hunt & Co., Chicago. Mr. Gennet will illustrate his talk with samples of actual rail failures which he has collected from roads all over the United States. The meeting will be preceded by a get-together dinner in the dining room of the hotel at 6 p. m., standard time.

The Material Market

IT IS NOW very clear that those railroads which went into the market for iron and steel products, lumber and other building materials during the early part of March purchased to better advantage than those that have delayed their orders until the present time. It is also apparent from the present trend of the market that the sooner the deferred purchases are placed the better it will be for the buyer. The tendency is towards advances in prices all along the line. This is a direct result of a most obvious cause—an increased demand. In the iron and steel industry, the best reflection of business conditions is the tonnage of unfilled orders on the books of the United States Steel Corporation. This was at its lowest ebb at the end of February, 1922, at 4,141,069 tons, and had increased to 5,096,915 tons by the end of April.

While the present market could hardly be said too be a sellers' market, conditions are no longer so favorable to the buyer and the mills are not able to offer as favorable dates of delivery as they could a month ago. Aside from the uncertainty caused by the coal strike a considerable increase in the prosperity of the automobile industry is said to be an important item in the present situation.

	Prices in Cents Per Pound			
	Pittsburgh	Chicago	Pittsburgh	Chicago
	April 20		May 20	
Track spikes	$2.00 to $2.15	$2.38 to $2.63	$2.15 to $2.25	$2.40 to $2.63
Track bolts	....	3.38 to 3.43	.... 3.00	3.40 3.63
Angle bars	.... 2.40	.... 2.40	.... 2.40	.... 2.40
Tie plates, steel	....	.... 1.75	.... 1.75	.... 1.85
Tie plates, iron	....	.... 1.75	....	.... 1.85
Plain wire	.... 2.25	.... 2.63	.... 2 25	.... 2.63
Wire nails	2.40 to 2.50	.... 2.88	2.40 to 2.50	2.78 to 2.88
Barbed wire, gal.	3.05 to 3.15	.... 3.53	3.05 to 3.15	3.43 to 3.53
C. I. pipe, 6 in. or larger, per ton	....	.... 43.10	....	.... 44.60
Plates	.... 1.50	1.60 to 1.80	1.50 to 1.75	1.65 to 1.80
Shapes	.... 1.50	1.60 to 1.70	1.50 to 1.75	1.65 to 1.75
Bars	1.50 to 1.60	1.60 to 1.70	1.50 to 1.75	1.65 to 1.75

Whereas the fortunate railway as a purchaser was the one which placed its principal orders some time ago, the road with scrap to sell now is in a position to secure a much better return than those who disposed of their stocks some week ago. The table below shows a general advance:

	Prices Per Gross Ton at Chicago	
	April	May
Relaying rails	$20.00 to $25.00	$22.50 to $27.50
Rerolling rails	14.00 to 14.50	15.75 to 16.25
Rails less than 3 ft. long	14.00 to 14.50	15.75 to 16.25
Frogs and switches cut apart	13.25 to 13.75	15.00 to 15.00
	Per Net Ton	
No. 1 railroad wrought	11.75 to 12.00	13.50 to 14.00
Steel angle bars	12.25 to 12.50	14.00 to 14.50

The lumber market is also sharing in the general increase in prices as indicated by the table following. This condition is again the obvious result of the changed relation of purchases and production. Through the early weeks of the year, the production of lumber was considerably in excess of the sales. This has changed within recent weeks, during which the sales are considerably in excess of production, so that at present the relationship is one which naturally leads to higher prices. Thus, for the first 19 weeks of 1922, the production of lumber reported by the West Coast Lumbermen's Association was 1,488,968,000 ft. while the sales for the same period aggregated 1,505,639,000 ft. In the Southern pine field the increase in orders on hand for the week ending May 19 was 18,799,000 board ft.

	April	May
Flooring, 1x4, B. and B. flat	$41.65	$41.60
Boards, 1x8, 14 and 16, No. 1	24.91	.....
Dimension, 2x4, 16, No. 1	21.40	23.70
Dimension, 2x10, 16, No. 1, common	21.05	23.20
Timbers, 4x4 to 8x8, No. 1	19.35	21 05
Timbers, 3x12 to 12x12, No. 1	25.10	27.55
Douglas Fir Mill Prices		
Flooring, 1x4, No. 2, clear, flat	$29.00	$32.00
Boards, 1x6, 6 to 20, No. 1, common	10.00	12.00
Dimension, 2x4, 16, No. 1, common	11.50	13.50
Dimension, 2x10, 16, No. 1, common	11.50	14.50
Timbers, 6x6 to 8x8, No. 1, common	15.00	18.00
Timbers, 10x10 to 12x12, rough	15.00	17.00

General News

The Southern's new double-track bridge across the Ohio river at Cincinnati was opened for heavy freight traffic on May 1. The new bridge is 4,300 ft. long, consisting of 1,600 ft. of trusses, 1,600 ft. of girder spans and 1,100 ft. of fill supported by concrete retaining walls. A draw span of the vertical type 365 ft. long with a clearance of 53 ft. above high water for river navigation takes the place of a swing span in the old bridge.

Utilizing the radiophone to disseminate information calculated to reduce accidents now constitutes one of the methods by which a number of eastern roads are conducting their safety work. The possibilities in this avenue of publicity are indicated by the arrangements made by the Pennsylvania to have a safety message broadcasted from the Westinghouse stations in Pittsburgh, Pa., Chicago, Newark, N. J., and Springfield, Mass., during the evening of May 16.

John G. Sullivan, formerly chief engineer of the Canadian Pacific, has been retained by the Province of British Columbia to investigate conditions on the Pacific Great Eastern, which is owned and operated by that province and which has for some time been showing a deficit. It is intended that Mr. Sullivan will advise the government as to the best methods of maintaining the line already constructed and recommend a proper route for its extension to Prince George, where a connection will be made with the Grand Trunk.

The Pullman Company is preparing plans for the establishing of a large chorus among its 1,000 porters. For this purpose the company has divided the country into eight zones in each of which will be established a chorus of 50 men, except in the zones including such cities as Chicago or New York, where it is probable that a larger number will be enrolled. Upon the establishment of the entire organization, it is planned to hold grand concerts each year with full orchestra and band facilities. Major M. Clark Smith, a musician of renown, will train this chorus.

Statistics compiled by the Interstate Commerce Commission show the compensation paid to railway employees during the last six months of 1921 to have been $1,343,886,463, which was a decrease of $690,829,725 or 33.9 per cent from the amount paid for the corresponding period in 1920. These statistics also show that the number of employees during this period averaged 1,592,775, which was a decrease of 416,384 or 19.7 per cent from the number employed during the same period of the previous year. The average earnings for employees per month during this period of 1920 were shown to be $178.

A motion picture theater has been established at one end of the main waiting room in the St. Louis, Mo., Union Station. This theater is in continuous operation from 10 a. m. until 10 p. m., and is maintained by charging an admission of 22 cents. Announcements are made in the theater of the arrival and departure of all trains, permitting travelers to remain in the theater until the last moment. The theater is so well patronized that merchants in the vicinity of the station have protested against its continued operation, on the grounds that it keeps railroad travelers off the street. This protest, thus far, has not been recognized.

A law to compel automobiles to stop at crossings has been passed by Virginia to check highway crossing accidents in that state. The law provides that drivers of all vehicles, on approaching any grade crossing of a main line railway track outside an incorporated town, must stop at a point not less than 10 ft. nor more than 100 ft. from the nearest rail. The penalty for violation of this law is $10.

The Union of Skilled Railway Maintenance of Way Employees has been organized at Macon, Georgia. J. O. Raley of Macon has been elected president and G. N. Hutt of Enterprise, Mississippi, secretary. It is reported that the purpose of this union will be to take in all employees of the maintenance of way department above the rank of common laborers.

Among the large railway construction projects now approaching completion is the Causeway at Galveston, Texas, which was severely damaged by a storm in August, 1915, and is now being completed a second time with such modifications as will afford security against future storms. The Causeway comprises a two-mile connection between the island city and the mainland and as originally built consisted of 28 70-ft. concrete arches and long embankment approaches. The storm washed out large portions of these approaches and they have been replaced by 79 new concrete arches of 60-ft. span. The structure accommodates two railway tracks, an interurban track and a 21-ft. driveway, making an over-all width of about 63 ft. The construction was begun December 15, 1917, and is now about completed.

Yellow Tail Lights for automobiles as a substitute for red tail lights has recently been suggested and are receiving favorable attention by students of safety as a means of reducing highway accidents. The principal claim for this change is based upon the psychological effect experienced by automobile drivers in seeing a multitude of red lights while driving at night, the argument being that the use of red lights for automobiles as well as for crossing signals, road obstruction warning, etc., has the effect of detracting from the significance of the red light. The claim is also made that locomotive engine men are often confused by red tail lights of automobiles on highways adjacent to the main line and that any attempt to eliminate this confusion by maintaining the important lights at higher elevations is ineffectual by reason of the irregularities in the ground, etc. With yellow as the automobile tail light signal, it is claimed that the red light will create a more forceful impression upon all persons who see it.

Beginning June 1st, and continuing until September 30th, the railroads of the United States will conduct a nation-wide crossing campaign, under the auspices of the Safety section of the American Railway Association, in an effort to reduce to a minimum the number of accidents at big heavy crossings during the summer season. The campaign will be called a "careful crossing campaign" with "cross crossing cautiously," the campaign slogan, for use on all bulletin circulars and posters. The conspicuous feature of the campaign will be a three color poster bearing a picture of an impending crossing disaster, these posters to be placed at conspicuous places at all railroad crossings as well as within and around all buildings frequented by the public. Small facsimiles of the poster will also be provided in sticker form for use on windshields of automobiles and correspondence. An extensive organization has been provided to conduct the campaign which will consist not only of posting bulletins at crossings but in giving lectures to the public and carrying on publicity work with the aid of moving pictures and various publicity bureaus.

Personal Mention

General

A. G. Mitchell, who was promoted to secretary of the Association of Transportation Officers of the Pennsylvania on April 22, is an engineer by education and experience. He was born at Madison, Me., on February 3, 1855, and was graduated from the University of Maine in 1875, whereupon he entered the service of the Somerset (now Maine Central). In February, 1880, he entered the employ of the Pennsylvania as a rodman, was promoted to transitman the following year, and, a few months later, to assistant engineer, which position he held until 1882 when he went with the H. C. Frick Coke Company as assistant to the chief engineer. He re-entered the service of the Pennsylvania in 1884 as assistant engineer in the office of the engineer maintenance of way and a few months later was appointed assistant supervisor at Huntingdon, Pa. He served in a similar capacity at Spruce Creek, Pa., and Philadelphia, and was promoted to supervisor at Monongahela City, Pa., in 1887, and transferred to Gallitzin in 1888. In 1891 he was promoted to assistant engineer of the Monongahela division and was advanced to superintendent of the same division in 1901. In 1918 he was transferred to the West Jersey & Seashore and the Camden Terminal division, which position he held at the time of his recent promotion.

A. C. Mitchell

Edmund Pennington, who retired as president of the Minneapolis, St. Paul & Sault Ste. Marie, and was elected its chairman, May 16, was employed in maintenance of way way for seven of his 53 years of railway service. Mr. Pennington was born at La Salle, Ill., September 16, 1848, and entered railway service in 1869 as a warehouse man on the Chicago, Milwaukee & St. Paul. A year later he became a brakeman on that road and continued in train service as a brakeman and conductor until 1875, when he entered the maintenance of way department as a roadmaster. Two years later he was promoted to a superintendent of construction, a position he held until 1879, when he was advanced to general roadmaster. After serving in this position for three years, he entered the operating department as assistant superintendent, and finally in 1884, left the service of the Chicago, Milwaukee & St. Paul to become superintendent on the Minneapolis & Pacific. With the consolidation of this road with the Minneapolis, St. Paul & Sault Ste. Marie at the time of its organization in June, 1888, he continued as a superintendent under the new management until April 15, 1898, when he was promoted to general superintendent. Consecutively, thereafter, Mr. Pennington was general superintendent on the Minneapolis, St. Paul & Sault Ste. Marie from April, 1898, to February 1, 1899, general manager from February 1, 1899 to July 31, 1905, and vice president and general manager from July 31, 1905, to March 11, 1909, when he was elected president. Since that time, Mr. Pennington has been elected to serve as chief executive of other properties until at the time of his retirement, he was president, not only of the Minneapolis, St. Paul & Sault Ste. Marie, but also of the Wisconsin Central (a leased property), the Central Terminal Company, Chicago, the Duluth, South Shore & Atlantic, the Mineral Range and the Spokane International.

Edmund Pennington

W. D. Pearce, supervisor of bridges and buildings on the Northern Pacific, with headquarters at Glendive, Mont., has been promoted to general manager of the Walla Walla, a subsidiary of the Northern Pacific, with headquarters at Walla Walla, Wash., to succeed **C. S. Walters,** resigned. Mr. Pearce was born in 1888 and entered the service of the Northern Pacific on May 16, 1906, as a rodman, in which capacity he served until November 25, 1908, when he was promoted to instrumentman. He was advanced to assistant engineer on April 23, 1909, and continued in this capacity until 1915, when he was promoted to supervisor of bridges and buildings. He left this work to enter the operating department as trainmaster on the Yellowstone division, with headquarters at Forsyth, Mont., on November 25, 1918, but re-entered the bridge and building department as supervisor of bridges and buildings at Glendive on April 15, 1921, serving in this capacity until his recent promotion.

Mr. Orlando H. Frick, district engineer on the Chicago, Milwaukee & St. Paul at Milwaukee, Wis., has been promoted to superintendent of the La Crosse division, with headquarters at Portage, Wis. Mr. Frick was born at Manitowoc, Wis., on September 25, 1879, and was graduated from the University of Wisconsin in 1902. He started his railway career the same year as a levelman on the Louisville & Nashville, and a short time later took a position on the Chicago, Rock Island & Pacific as assistant engineer, which he held until 1904 when he became resident engineer on the Missouri, Oklahoma & Gulf. Leaving this position in September, 1904, he was employed for two months as resident engineer on the Appalachicola Northern and then entered the service of the Chicago, Milwaukee & St. Paul, with which company he has since remained. He served 10 years as assistant engineer and later as pilot engineer and field engineer on valuation work until April, 1919, when he was promoted to district engineer, and continued in the latter position until his recent promotion to superintendent.

Engineering

J. T. Edwards, assistant division engineer on the Southern Pacific with headquarters at Ogden, Utah, has been transferred to the Los Angeles division with headquarters at Los Angles to succeed **D. M. Crossman,** assigned to other duties.

F. A. Feikert, an employee on the Portland division of the Southern Pacific with headquarters at Portland, Oregon, has been promoted to office engineer of the Portland division to succeed **H. L. Archbold,** who has been promoted to assistant division engineer of the Salt Lake division with headquarters at Ogden, Utah.

H. A. Hampton, principal assistant division engineer on the Portland division of the Southern Pacific, with headquarters at Portland, Oregon, has been promoted to division engineer of the same division with the same headquarters, effective May 1, to succeed **E. E. Mayo,** who has been transferred to the Sacramento division with headquarters at Sacramento, Cal., to succeed **F. M. Siefer,** transferred. Mr. Hampton was born at Portland, Oregon, on September 21, 1882, and was educated at the University of Oregon, from which he was graduated in 1907. He entered railway service in December, 1907, as an instrumentman with the Oregon-Washington Railroad and Navigation Company at Portland, Oregon, where he remained until April, 1908, when he entered the

service of the Southern Pacific as an instrumentman in the maintenance of way department. He served in this capacity and later as office engineer until November, 1917, when he was promoted to principal assistant engineer of the Portland division with headquarters at Portland, Ore., which position he held at the time of his recent promotion.

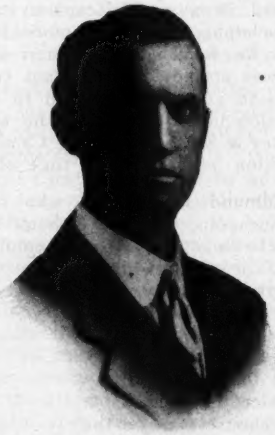
C. U. Smith, assistant engineer on the Chicago, Milwaukee & St. Paul at Milwaukee, Wis., has been promoted to district engineer of the Middle district, with headquarters at Milwaukee, effective May 1, succeeding **O. H. Frick,** who has been promoted to superintendent of the La Crosse division. Mr. Smith was born at Philadelphia on June 20, 1883, and was graduated from Armour Institute of Technology, Chicago, in 1907. He entered railway service in June, 1907, as an instrumentman on location on the Chicago, Milwaukee & St. Paul at Taft, Mont., in the Bitter Root mountains. For the next seven years he served consecutively as instrumentman on location, as engineer in charge of concrete work on several bridge and terminal projects on the Pacific Coast extension, as resident engineer on the Cannon Ball River line in South Dakota, and on double track work in Minnesota. He was promoted to assistant engineer in charge of concrete work on the Middle district with headquarters at Milwaukee in 1914. In 1917 he entered military service as a captain in the 107th Engineer, 32nd Division, with which he served throughout the operations of this division overseas, until his discharge in May, 1919, when he returned to the Chicago, Milwaukee & St. Paul, as assistant engineer on the Middle district, where he remained until December, 1920, when he was promoted to assistant engineer of the Chicago and Milwaukee and the Northern divisions, the position he held at the time of his recent promotion.

C. U. Smith

L. J. Hughes, assistant engineer on the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been promoted to division engineer, with the same headquarters, effective May 15, to succeed **A. C. Bradley,** who has been transferred to Fairbury, Neb., to succeed **J. G. Bloom,** who has been promoted to engineer maintenance of way of the system, with headquarters at Chicago. Mr. Hughes was born at Billerica, Que., May 24, 1884, and was educated at Rennselaer Polytechnic Institute, Troy, N. Y., from which he was graduated as a civil engineer in 1905. Thereafter he was employed as an instrumentman by the Illinois Tunnel Company at Chicago and later as a draftsman at the Lassig plant of the American Bridge Company, Chicago, until October 1, 1906, when he entered railway service as a draftsman in the bridge engineer's office of the Chicago, Rock Island & Pacific at Chicago. Thereafter he served in the successive capacities of bridge inspector, assistant engineer and division engineer until 1907, when he entered military service as first lieutenant in the First Illinois Engineers, a National Guard regiment, subsequently designated as the 108th Engineers, with which he served as captain. Discharged from military service in 1919, he returned to the Chicago, Rock Island & Pacific as inspector of maintenance of way instructions on the staff of the vice-president in charge of construction and maintenance, which position he held until his recent promotion.

B. L. Martin, engineer of maintenance of way of the Missouri, Kansas & Texas, with headquarters at Dallas, Tex., has resigned, effective June 1, to become vice-president of the Hutt Contracting Company, Kansas City, Mo., in which he has purchased a substantial interest. Mr. Martin was born in Elgin, Texas, on July 28, 1879, and was educated at the Texas College of Agriculture and Mechanic Arts, from which he was graduated in June 9, 1899, as a civil engineer. He entered railway service immediately following his graduation as an axman on location on the Texas & New Orleans between Beaumont, Tex., and Dallas. Three months later he entered the service of the Southern Pacific, where he served consecutively as rodman, instrumentman and assistant engineer on various constructions projects until 1902, when he resigned to become assistant engineer on the Kansas City Southern at Pittsburg, Kan. Three years later he entered the employ of the Gulf, Colorado & Santa Fe in Texas and continued with this road as division engineer and assistant engineer on construction until 1912, when he resigned to take charge of the location and construction of 20 miles of railway for an industry, upon the completion of which he entered the service of the Missouri, Kansas & Texas, with headquarters at Denison, Tex. Shortly thereafter he was placed in charge of the construction of the San Antonio (Texas) Terminal, where he remained until May, 1916, when he was promoted to engineer maintenance of way of the Texas lines. He was transferred to the Kansas lines in February, 1918, and on March 1, 1919, was promoted to chief engineer of the Missouri, Kansas & Texas, the Missouri, Kansas & Texas of Texas, the Missouri, Oklahoma & Gulf and the Wichita Falls & North Western, under the railroad administration, which position he held until the termination of federal control, when he was apppointed assistant chief engineer in charge of maintenance of way, a title which was changed later to engineer maintenance of way of the system.

J. A. Snyder, roadmaster on the Michigan Central with headquarters at Jackson, Mich., has been promoted to division engineer of the Detroit switching territory and the Detroit-Toledo division with headquarters at Detroit, Mich., effective May 1, to succeed **John Evans** who has been transferred to the Detroit-Jackson and Detroit-Bay City divisions also with headquarters at Detroit, to succeed **E. C. Wurzer,** who has resigned, to engage in the general contracting business as a member of the firm of F. Talma & Company, Detroit, Mich. Mr. Snyder was born in Williams County, Ohio, on Jan. 25, 1875, and attended Adrian College for two years, following which he entered railway service as a rodman on the Chicago, Rock Island & Pacific at Topeka, Kan. He served as rodman and instrumentman on this road from March 15, 1905, to September 1, 1906, when he entered the service of the Chicago & North Western at Chicago, as a rodman, remaining with this company until February 15, 1907, when he became connected with the Detroit River Tunnel Company (controlled by the Michigan Central) at Detroit. He served consecutively as inspector, recorder and estimator for this company until June 15, 1910, when he became an instrumentman on the Detroit Terminal Railroad, also at Detroit. He entered the service of the Michigan Central on November 12, 1911, where he served until July 3, 1913, as a draftsman and instrumentman, at Detroit, and from October 7, 1913, to June, 1914, as an instrumentman with the same headquarters. On the latter date he left the service of the Michigan Central to become an inspecor in the Department of Public Works of Highland Park, Mich., but returned on October 10, 1914, from which date he served as an assistant engineer with headquarters at



J. A. Snyder

Jackson, Mich., until March 15, 1917, when he was promoted to roadmaster with the same headquarters, the position he held at the time of his recent promotion.

Track

M. H. Kilgore has been promoted to roadmaster on the eastern division of the Western Pacific, with headquarters at Wendover, Utah, effective May 1, to succeed **C. Duckworth.**

George E. Boyd, formerly division engineer on the Delaware, Lackawanna & Western at Buffalo, N. Y., has been appointed district roadmaster on the Wheeling & Lake Erie, with headquarters at Canton, Ohio, to succeed **M. King.**

K. O. Shepard, roadmaster on the Shore Line subdivision and St. John Terminals of the Canadian Pacific, with headquarters at St. Johns, New Brunswick, has been transferred to the Newport and Oxford subdivision, with headquarters at Farnham, Quebec, to succeed **L. Heberd.**

G. A. Kelly has been promoted to roadmaster on the Canadian Pacific, with headquarters at Lethbridge, Alberta, to succeed **C. H. Johnson,** transferred to Brandon, Manitoba, to succeed **L. N. Murphy,** transferred to Lake Windermere, to succeed **G. Erickson,** who has been pensioned.

G. A. Owens, whose promotion to roadmaster on the Shore Line subdivision and the St. John terminals of the Canadian Pacific was announced in last month's issue, was born in Ontario, Canada, and entered railway service in June, 1893, as a section hand on the Canadian Pacific. He remained in this position from 1893 to August, 1905, serving in different localities, when he was promoted to section foreman. In June, 1906, he was transferred to another location as extra gang foreman and later was again transferred as plow foreman. He was promoted to acting roadmaster in March, 1917, and remained in this position until August, 1921, when he was made extra gang foreman on the Smith Falls division. In January, 1922, he was transferred as assistant yard foreman and snow plow foreman and in April, 1922, was promoted to roadmaster, as noted, with headquarters at St. Johns, N. B.

J. W. Starkey has been promoted to roadmaster of the Los Angeles division of the Southern Pacific, with headquarters at Niland, Cal., effective April 26, to succeed **C. C. Clark,** resigned. Mr. Starkey was born in 1881 and entered service in June, 1899, as a section laborer on the Southern Pacific, in which capacity he was employed until June, 1901, when he was promoted to section foreman. He served as section foreman and extra gang foreman on the Shasta division until June 1, 1908, when he was transferred to the Sacramento division as an extra gang foreman. He was transferred to the Los Angeles division in May, 1913, where he served as extra gang foreman until January, 1919, when he was promoted to roadmaster on the Tuscon division. He was transferred to the Los Angeles division as general foreman in December, 1921, and was promoted to roadmaster on October 15, 1921, a position he held until November 16, of that year. Since then he has served as general foreman and extra gang foreman until his recent promotion to roadmaster at Niland.

H. J. Krohn, yard foreman on the Chicago, Milwaukee & St. Paul at Portage, Wis., has been promoted to roadmaster of the Aberdeen division with headquarters at Aberdeen, S. D., to succeed **J. E. Haley,** who has been transferred to Beloit, Wis., to succeed **J. Hubenthal.** Mr. Krohn was born at Webster, Ia., in 1889 and entered railway service as a section laborer on the Chicago, Milwaukee & St. Paul at Newhall, Ia., in 1908. In 1909 he was employed in a similar capacity on the Chicago & North Western at Blairstown, Ia., and in 1910 he re-entered the service of the Chicago, Milwaukee & St. Paul, where he remained as a time-keeper until 1912, when he was promoted to assistant extra gang foreman. In the following year, he was promoted to section foreman at Perry, Ia., and continued as such until 1916, when he entered the employ of the Northern Pacific at Staples, Minn., as a steel gang foreman. In 1918 he returned to the Chicago, Milwaukee & St. Paul as an extra gang foreman at Milwaukee, Wis., where he remained until 1920, when he was promoted to general foreman of the Aberdeen division with headquarters at Aberdeen, S. D. A year later he became a yard foreman at Portage, Wis., and held this position until his recent promotion to roadmaster at Aberdeen, S. D.

Bridge and Building

H. A. Cameron has been promoted to chief carpenter of the Terre Haute division of the Chicago, Milwaukee & St. Paul, with headquarters at Terre Haute, Ind., effective April 16, to succeed **J. O. Jewell,** resigned.

W. T. Sprague has been promoted to supervisor of bridges and buildings of the Houston, East & West Texas and the Houston & Shreveport, with headquarters at Houston, Texas, effective April 16. Mr. Sprague was born at De Kalb, Ill., on October 14, 1869, and entered railway service in December, 1900, as a bridge carpenter on the Gulf, Colorado & Santa Fe. In 1902 he was promoted to bridge and building foreman, which position he held until October, 1904, when he entered the service of the Houston & Texas Central in the same capacity. He was placed in charge of a system pile driver on the Southern Pacific Lines in Texas and Louisiana in July, 1912, and continued in this capacity until April 15, 1922, the date of his promotion to supervisor of bridges and buildings on the Houston, East & West Texas Lines of the Southern Pacific, with jurisdiction from Houston to Shreveport, La.

Purchases and Stores

R. M. Nelson has been appointed purchasing agent of the Chesapeake & Ohio and **A. W. Hix** has been appointed assistant to the director of purchases and stores.

J. E. Bollinger, secretary to the manager of purchases of the American Short Line Railroad Association, has been appointed assistant to the manager of purchases with headquarters at Washington, D. C., effective May 1.

Obituary

William B. Sears, one of the builders of the Flint & Pere Marquette, now a part of the Pere Marquette System, died at Saginaw, Mich., May 2, at the age of 90 years.

Herbert Long, bridge foreman on the Bellingham, Wash., lines of the Chicago, Milwaukee & St. Paul, and an employee of that road for 36 years, died at Everett, Wash., on April 11. Mr. Long was born in New Brunswick, Nova Scotia, April 5, 1856, and entered the service of the Chicago, Milwaukee & St. Paul in 1886 as a pile inspector. He was promoted to yard foreman at Marion in 1888 and in November, 1907, was promoted to general foreman at Mobridge, S. D. He held this position at Mobridge and later at Deer Lodge, Mont., until May, 1909, when he was appointed chief carpenter at Tacoma, Wash. Consecutively, thereafter he served as chief carpenter from May, 1909, to Aug., 1911; as yard foreman at Tacoma, Wash., from Aug., 1911, to June, 1915; as a bridge foreman on the Port Angeles line from June, 1915 to 1919, and as a bridge foreman on the Bellingham line from that date until his death.

Albert Franklin Rust, consulting engineer of the Kansas City Southern with headquarters at Kansas City, Mo., died at his home in Kansas City, Mo., May 11, after a career of 50 years in railway service. Mr. Rust was born in Fultonville, N. Y., April 29, 1849, and was educated at Ripon College, Ripon, Wis., from which he was graduated in 1871. He entered railway service in 1872 as an axman on the Sheboygan & Fond du Lac (now a part of the Chicago & North Western), where he remained for a year, when he entered the service of the New York Central as a rodman. He was consecutively thereafter, rodman and assistant engineer on the Midland Pacific from 1874 to 1876, assistant engineer on the Union Pacific from 1876 to 1885, and division engineer on the Missouri Pacific thereafter until 1887, when he left railway service to engage in private practice at Omaha, Nebr. In 1889, he reentered railway service as division engineer on the Missouri Pacific and was consecutively a

division engineer on the Kansas City, Pittsburg and Gulf from 1893 to 1894, assistant engineer on the Missouri, Kansas & Texas from 1894 to 1895, resident engineer on the Kansas City, Pittsburg & Gulf from 1895 to 1897, and engineer maintenance of way on the same road from 1897 to 1899. He entered the service of the Kansas City Southern in 1899 as a chief engineer, in which capacity he served until 1911, when he became consulting and valuation engineer. Relieved of the duties of valuation engineer in 1918, he thereafter continued as consulting engineer until the time of his death.

Arthur S. Morris, an employee for several years in the engineering department of the Chicago & North Western, and for the past two years auditor of capital expenditure, died May 22 at his home in Oak Park, Ill., after a three months' illness. Mr. Morris was born in Chicago in 1880 and was graduated from Princeton university in 1903 as a civil engineer, since which he has served consecutively as chainman, rodman, instrumentman and assistant engineer on location, construction, maintenance, track elevation work and valuation on the Chicago & North Western until 1918, when has was appointed engineering auditor, a position he held until 1920, when he was promoted to auditor of capital expenditures, the position he held at the time of his death.

A bill introduced recently in Congress, authorizing the reappointment of Frederick Mears as a commissioned officer of the regular army, makes him available for continued service as chairman and chief engineer of the Alaskan Engineering Commission.

The Interstate Commerce Commission has authorized the abandonment of the Silverton Railway, a 15½-mile line extending from Silverton, Colo., to Joker Tunnel, and has been petitioned by the Pere Marquette for authority to abandon its Remus and Mecosta branches, 13 and 11 miles long respectively, in Mecosta county, Mich.

Aluminum Shingles.—A booklet has recently been issued by the American Aluminum Architecture Company, Aurora, Illinois, which is devoted to the construction of aluminum as a roofing material and to the describing and illustrating of its Ridgdown shingles and other roofing material which the company manufactures.

A new plan for the joint operation of railway property in the Chicago Terminal district has been made public in the form of a report by the Board of Economics and Engineering of the National Association of Owners of Railway Securities. This plan provides for conducting all through business around the city by using the Elgin, Joliet & Eastern and the Indiana Harbor Belt as belt lines. It is proposed to consolidate the traffic of six existing passenger terminals into three, namely, the North Western, the Union Station and the Illinois Central, and to provide for the control and operation of this system under one administration.

About 25,000 ties were imported from the Amazon district of Brazil and placed in tracks of about five eastern railways during 1915, 1916 and 1917, one railway placing 5,000 ties, including 15 or 20 different varieties of hard, heavy wood from Brazil. These ties were presumably well seasoned when put in service, but are reported to have failed and been removed from track during the past year except in the case of one species. Failure was reported to be principally that of brooming and to some extent decay. Among the 5,000 ties tried out by the one road many had to be removed during the second summer. All these ties had been adzed and bored at the treating plant, but were used untreated. As a result of experience with tropical woods on American railroads, one author sums up the situation as follows: (1) No definite conclusions can be established regarding the feasibility of introducing tropical ties on account of lack of definite experimental tests on a sufficient scale. (2) Great confusion exists in nomenclature and classification. (3) Too little is known of the relative merits, such as the durability of these woods even in their nature state, and (4) very little is known of the seasoning quality with particular reference to the effect of changes of climate and temperature on their usefulness.

Construction News

The Atchison, Topeka & Santa Fe has filed an application with the Interstate Commerce Commission for authority to acquire control of the Eldorado & Santa Fe by lease of its property and purchase of the capital stock. This company, which was reported in the April issue as contemplating the construction of a new power plant at San Bernardino, Cal., has authoribed the erection of an 80-ft. by 100-ft. structure and has authorized the construction of 75 miles of second track between Yampai, Ariz., and Griffith, reported as contemplated in the March issue. The company has also applied to the Interstate Commerce Commission for authority to build a 12-mile line from El Segundo, on the Redondo branch of the Los Angeles division, to Los Angeles Harbor.

This company has awarded a contract to Joseph E. Nelson & Sons, Chicago, for additions to its machine shop at Topeka, Kan., to cost approximately $60,000, and has closed bids for the construction of bunkhouses at Galesburg, Ill., Shopton, Iowa, Lexington Junction, Mo., Ottawa Junction, Strong City and Cherryvale, Kan., and Newkirk, Okla., which work will cost approximately $50,000.

The Bangor & Aroostook's 1922 budget includes the ballasting of 65 miles of road, the contract for which has been let to the Eyre-Johnson Company, Philadelphia; the relaying of 24 miles of track with 80 and 90-lb. rails; installing 200,000 new ties, 80,000 tie plates and 14,000 rail anchors; relaying a number of side-tracks with heavier steel; replacing 140 wooden culverts with cast-iron or concrete; the painting of 17 stations and 15 steel bridges, including the international bridge between Van Buren, Me., and St. Leonards, N. B.; extensive repairs to wire fences; the rebuilding of the engine house at Caribou, Me., probably with reinforced concrete, and the installation of a larger turntable; the construction of a new station, engine house and coaling plant at Squa Pan, Me.; repairing wharves at the company's tidewater terminal at Stockton Harbor; and extensive improvements to buildings at Derby, Me.

The Baltimore & Ohio has awarded a contract to the Empire Engineer Company, Baltimore, for the construction of a bridge at Brydon, W. Va., and for the preparation of roadbed for about two miles of second main track to be laid between Webster and Brydon. During the opening week of May, this company also placed contracts for two bridges. One of these involves the structure carrying the tracks of the railroad across East Maiden street, Washington, Pa. This bridge consists of three plate girder spans, with solid floor, total weight of steel about 90 tons. Contract covering the erection, concreting and waterproofing of the new structure was placed with the Seaboard Construction Company, Philadelphia. This railroad has also placed an order with the McClintic-Marshall Company for the fabrication of superstructure steel work for four plate-girder bridges to be installed on its Parkersburg branch, between Grafton and Parkersburg, W. Va. The new structures consist of plate girder spans, ranging in length from 64 to 112 ft., the total weight of steel involved about 350 tons. Delivery will be made during July, and the replacement of these structures will be pushed to completion during the present working season.

The Canadian Pacific has obtained appropriations of $331,000 and $410,000, respectively, from the province of Alberta, to construct a 13-mile extension of the Peace river branch and a 15-mile extension of the Grand Prairie branch of the Edmonton, Dunvegan & British Columbia, a line which it now operates under a five-year agreement with the Province of Alberta. Negotiations are being made at the present time for the proposed extensions and it is expected that an agreement will be reached permitting the undertaking of this work in the near future.

The Chesapeake & Ohio recently received bids for the erection of a freight station at Norfolk, Va., to cost approximately $125,000.

The Chicago & Northwestern is accepting bids for a 100-ton steel coaling station at Manitowoc, Wis. This company, noted in the May issue, as receiving bids for the construction of a 500-ton coaling station and ash handling facilities in Chicago, to cost $100,000, has awarded a contract for this work to the Roberts & Schaefer Company, Chicago. This company also awarded a contract to the White Construction Company, Milwaukee, Wis., for the construction of two subways in connection with track depression work in that city, the cost of which will approximate $60,000. This company contemplates rebuilding in the near future its 12-stall engine house at Ashland, Wis., destroyed by fire on May 4.

The Chicago, Burlington & Quincy has awarded contracts to the Ogle Construction Company, Chicago, for the construction of a 150-ton coaling station at Bridgeport, Neb., and for the construction of 100-ton coaling stations at Fairmont, Neb., and Benkleman. This company, reported in the May issue, as having closed bids for the construction of a 20 ft. by 60 ft. frame passenger station at Pattensburg, Mo., has awarded the contract for this work to G. A. Johnson, Chicago.

The Chicago, Milwaukee & St. Paul has resumed work on its Chicago and Evanston division track elevation between Irving Park boulevard and Howard street and contemplates finishing the balance of the program comprising the construction of a fourth track with necessary bridge slabs and seven stations to cost $700,000.

The Chicago, Rock Island & Pacific has awarded a contract to the Railway Water & Coal Handling Company, Chicago, for an 18,000 gal. per hour water treating plant at Estherville, Ia. This company will call for bids for the construction of a reinforced concrete undercrossing in connection with the separation of grades at Nora Springs, Ia. This company and the New York Central have each ordered approximately 370 tons of steel from the King Bridge Company, Cleveland, Ohio, for the renewal of track elevation bridges between Eighteenth and Sixtieth streets, Chicago. The Rock Island will soon order an equivalent amount of steel for like purposes for installation between Sixtieth and Seventy-second streets in that city.

The Chicago Union Station Company is calling for bids for the widening of Canal street between Madison and Washington streets, a distance of about 600 ft.

The Union Station has also called for bids for the construction of additional foundations for the Union Station head house as required by the additional floors to be built and for the construction of the first section of the head house known as the Canal Street space. This work will include all wrecking and excavating involved in the preparation of the site, the foundation work, the erecting of retaining walls and steel work and the installation of rough floor construction and fireproofing below and for some distance to either side of Canal street, between Adams and Jackson streets. The permanent roadway on Canal street and a portion of the sidewalk are also included in the work, together with the installing of such temporary partitions, plumbing fixtures and lighting and heating systems as are required to adapt the structure for use as a temporary passenger station.

The Cisco & Northeastern has awarded a contract to J. H. Latson, Cisco, Tex., for the construction of a 40-ft. by 200-ft. brick locomotive repair shop in that city, to cost $12,500.

The Cleveland, Cincinnati, Chicago & St. Louis, reported in the March issue, as contemplating the construction of approximately 12 miles of second main track from Farmland, Ind., to a point about 2 miles east of Muncie, has awarded the contract for the grading work to the Walsh Construction Company, Davenport, Ia., and for the concrete bridge and culvert work to the Read Construction Company, Indianapolis, Ind. This company has also under way the replacing of its bridge over the White river on its Evansville, Indianapolis & Terre Haute line, a few miles south of Bloomfield, Ind., with a modern structure consisting of four 100-ft. plate girder spans, a 60-ft. flanking span and 400-ft. of trestle approach, the girders for which have been secured and the masonry work and grading for which are also being done under a contract with the Walsh Construction Company. This company is now securing right of way for and expects to complete the grading and track work this summer by local contract for a 3½-mile cut-off on its Cleveland division between Columbus and Galion, Ohio. It will also replace four steel bridges at various points on its Evansville, Indianapolis & Terre Haute line, other than the White river crossing referred to above.

The Denver & Rio Grande Western is now erecting a temporary double-track steel bridge over the Arkansas river at Pueblo, Colo., to replace a pile structure until the city has decided between alternate plans of enlarging or relocating the present river channel, when a permanent steel structure will be erected.

The Denver & Salt Lake is giving immediate consideration to plans looking to the early commencement of construction of a tunnel through the continental divide and to the extension of its present line from Craig, Colo., or thereabouts in a northwesterly direction through the Uintah Basin to Provo or Springville, Utah, as the result of the governor's signing the Moffett tunnel bill, May 12, providing for the financing of this project. This tunnel will be approximately 6½ miles long, to construct which the law authorizes a bond issue of $6,720,000. Provisions are contained in the law for the accommodation of telegraph and telephone lines, for the transmission of power and water, and for the accommodation of vehicles as well as the railroad. A board of five commissioners is to be appointed by the governor, with full power under the law to prescribe all regulations concerning the tunnel.

The Dodge City & Cimarron reported in the February issue as applying to the Interstate Commerce Commission for authority to construct a 56-mile extension to its lines from Satanta, Kan., through Haskell, Grant and Stanton counties, has obtained this authority and awarded the contract for the work to the Scott, White Company, St. Louis, Mo., which is now undertaking this work.

The Grand Trunk is engaged in negotiations with the city of Detroit in contemplation of the separation of grades along De Quindre street, involving about $4,000,000. Plans have been agreed upon and it is expected that an agreement will be reached in the near future leading to a partial undertaking of the work this year.

The Great Northern has called for bids for the construction of an 84-ft. by 300-ft. frame car repair shed at Minot, N. D. This road has awarded a contract to the National Boiler Washing Company, Chicago, for the construction of a hot water washout and refill system at Wenatchee, Wash., and to the F. W. Miller Heating Company, Chicago, for a similar system at Minneapolis Junction, Minn.

The Gulf, Colorado & Santa Fe has awarded a contract to H. D. McCoy, Cleburne, Tex., for the construction of a freight station at Brenham, Tex., to consist of a two-story head house, 32 by 36 ft., and a 32 by 80-ft. warehouse, together with covered and uncovered platforms.

The Gulf & Ship Island is now building with company forces at Gulfport, Miss., an all-steel combined engine house, boiler shop and blacksmith shop and a masonry and steel machine shop, together with cinder handling facilities and new track, the construction of which will involve an expenditure of $250,000.

The Illinois Central reported in the issue of August, 1921, as having closed bids for the construction of a 20,000-gal.-per-hour capacity pumping station at Ramsey, Ill., and which decided later to postpone the work, has now awarded the contract to Joseph E. Nelson & Sons, Chicago. This company has closed bids for the construction of a $75,000 brick freight station at Baton Rouge, La., and has awarded a contract to the Railway Water & Coal Handling Company, Chicago, for the construction of a 75-ton coaling station at Levy yard, New Orleans, La.

The Kettle Valley has now under way the construction of approximately 17 miles of line from Okanagan Falls to Oliver, in the southern district of British Columbia. This work constitutes the third link of a rail and lake system to connect the town of Penticton with irrigated land which the provincial government of British Columbia has prepared for settlement by ex-soldiers. The work is being performed by A. E. Griffin & Company, Vancouver, B. C.

The Lacombe & Northwestern, which was acquired by the Province of Alberta, Canada, a few years ago, will be extended this season for a distance of about twelve miles. A sum of $265,000 has been authorized for the purpose and all work will be carried out by contract, bids for which will be called in the near future.

The Lehigh & New England has awarded a contract to F. H. Clement & Company for labor and materials for concrete masonry required for four bridge replacements in the state of New York and two in New Jersey and for the temporary support of tracks during construction. The estimated cost of this work is $58,000.

The Lehigh Valley, in connection with its work on the Claremont (Jersey City) pier and terminal project, has awarded a contract to the Henry Steers Company, New York, for a shop and electric substation.

The Los Angeles & Salt Lake has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a branch from Delta to Filmore, Utah, 35 miles.

The Louisville and Nashville has ordered a "N. & W." type cinder plant from the Roberts & Schaefer Company, Chicago, for installation at Corbin, Ky.

The Michigan Central has awarded a contract to the Dominion Construction Company, Toronto, Ont., for the construction of the greater part of the second unit of its freight terminal and classification yard at Niles, Mich., the first unit of which, comprising the locomotive terminal and westbound yard, was completed in December, 1919. A current authorization of $500,000 has been made to cover principally 320,000 cu. yd. of excavation, the construction of the eastbound hump and eight 100-car receiving tracks, 400,000 cu. yd. of embankment and twelve 100-car tracks of a 25-track classification yard, together with a permanent connection with the South Bend division tracks. It is intended to complete the entire project in 1923.

This company, reported in the April issue as having closed bids for the construction of a $35,000 brick passenger station at Hastings, Mich., has awarded a contract to the Ehle Construction Company, Grand Rapids, Mich., for this work.

The Missouri & North Arkansas has appropriated $750,000 of a $3,500,000 loan recently secured from the government for placing its property in normal condition. Of this amount, it is estimated that approximately $9,000 will be expended for renewals of water stations and $82,000 for bridge renewals. The major portion, if not all of this work, is to be done by company forces.

The Nashville, Chattanooga & St. Louis is undertaking with company forces the construction of two bridges over the Harpeth river, each bridge to consist of three 96-ft. deck plate girders, with creosoted timber ballast decks supported on concrete piers and abutments, which work will cost approximately $160,000. The contract for the steel work was let to the American Bridge Company.

The New York Central has awarded a contract to the Walsh Construction Company, Davenport, Ia., for the Garrison tunnel improvement work near Garrison, N. Y. The estimated cost is about $500,000 and will consist of the excavation for an open cut in rock for two tracks to the east of the existing tracks and on line for a permanent four-track development. This company has authorized the immediate commencement of work on the Castleton bridge and cut-off calling for the ultimate expenditure of approximately $20,000,000, the expenditure for the next two years being about $12,000,000. The improvement work involved in the above includes a high-level steel bridge across the Hudson river about 12 miles south of Albany, N. Y., a large freight classification yard in the vicinity of Feura Bush, N. Y., and about 20 miles of double-track connections linking up the railroad with the West Shore and the Boston & Albany by easy grades. This improvement will increase the freight and passenger carrying capacity of the road while it may make possible a reduction in time of transit of fast freight between the North Atlantic ports and the Middle West. Invitations for bids on the erection, masonry, grading, dredging and other work have been sent out and everything is being done to facilitate the quick completion of the bridge, the yard and the more important parts of the rail connections. All grade crossings in connection with the project will be eliminated. The bridge will be double track with provision for two additional tracks at some future date. It will have one 600-ft. and one 400-ft. main truss spans over the channel, flanked by steel viaduct approaches, the total length being about one mile. It is expected that this work will be completed and in operation early in 1924. A contract has been awarded to the Walsh Construction Company, Davenport, Ia., for the grading and masonry in connection with this project.

The Northern Pacific has authorized the raising of tracks in Seattle, Wash., incident to improving Ninth avenue south, to cost about $60,000; the replacing of a timber bridge over Olegua Creek near Winslock, Wash., with deck girder spans to cost approximately $50,000; the replacing of a timber trestle over Wilson Creek, near Indio, Wash., with two 100-ft. plate girder spans to cost approximately $41,000; the replacing of a turntable at Livingston, Mont., to cost approximately $41,000; the construction of an 80-ft. extension to the inbound freight house office at Seattle, Wash., including a new heating plant to cost approximately $22,000; the replacing of the dry kiln at Brainerd, Wash., with a modern kiln of larger capacity, to cost approximately $37,000; and the construction of a car repair shed at Auburn, Wash., to cost approximately $20,000.

This company has awarded a contract to Grant Smith & Co., St. Paul, Minn., for a new bridge over the Mississippi river at Minneapolis, Minn., to cost $400,000; has awarded a contract to the Campbell Construction Company, St. Paul, Minn., for a permanent bridge at Maryland street, St. Paul, to cost approximately $60,000, and has awarded contracts to Barnett & Record and W. N. Hill, Duluth, Minn., and to Grant Smith & Company, St. Paul, Minn., for repairs and improvements to dock No. 6, Duluth, Minn., and has awarded a contract to Winston Brothers & Grant, Minneapolis, for the construction of a $250,000 passenger station and office building at Glendive, Mont.

This company has authorized the construction of a second main track at Duluth, Minn., to cost approximately $38,000, and the building of settling basins and other water supply facilities at Zero, Mont., to cost approximately $16,000; has closed bids for the construction of a $180,000 double track bridge over the Yellowstone river at Huntley, Mont., to replace its single track structure at that point and has awarded a contract to the Clifton Applegate & Toole Company, Spokane, Wash., for the construction of a tunnel and other work on its Phileman line change in western Montana, to cost in excess of $100,000.

The Northern Pacific Terminal Co. is increasing the track layout in its station at Portland, Ore., and is now undertaking the construction of a new yard upon property recently acquired 2 or 3 miles from Portland. In connection with this work, a petition has been filed with the city of Portland for extensive street vacations required to provide for increased trackage within the city limits.

The Oklahoma-Southwestern has awarded a contract to the Allhands & Davis Construction Company, Joplin, Mo., for the construction of a 10-mile extension from Nuyaka to Okmulgee, Okla., and contemplates further extensions in the near future. It is expected that the grading for the Nuyaka-Okmulgee extension will begin during the month.

The Oklahoma Northern has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from Vinita, Okla., to Coffeyville, Kans., 42 miles.

The Oregon Short Line has obtained authority from the Interstate Commerce Commission to construct an extension of the Homedale branch from its present terminus at Homedale, Idaho, in a southeasterly direction, a distance of 7½ miles.

The Pacific Fruit Express has called for bids for the construction of an artificial icing plant on the Southern Pacific at Bakersfield, Calif., to cost approximately $400,000.

The Pennsylvania recently called for bids for the construction of a reinforced concrete overhead highway bridge over the tracks of the Turtle Creek Branch extension to Salts-

burg, Pa. This company will build this summer an addition to its concrete, fireproof grain elevator at Baltimore, Md., to take care of an additional 1,300,000 bu. of grain.

The Pennsylvania is also accepting bids for the construction of a single-track girder type bridge to carry its Bellefonte branch line track over the state highway east of Louisburg, Pa. This work will involve 1,800 yd. of excavation, 690 cu. yd. of masonry and about 2,200 tons of steel.

The Pere Marquette, reported in the March issue as contemplating the completion of the Flint belt line, involving a total cost of approximately $650,000, is going ahead with this work and expects to complete it this year.

The Philadelphia & Reading has awarded a contract to F. W. Van Loon, Philadelphia, for the construction of a passenger station at Fourteenth street, Ocean, N. J.

The Southern Pacific has entered into an agreement with the city of Houston, Tex., for the construction of a subway in that city, the contract for which has been awarded to Walling-Haralson & Adams Company, Houston, Tex.

The Texas & Panhandle, representing local business interests, has had under consideration for several years and is now about to petition the Interstate Commerce Commission for authority to construct a 300-mile line from Seymour, Tex., in the Wichita Valley, northeasterly to Tucumcari, N. M., on the Chicago, Rock Island & Pacific. The proposed line will cross the Kansas City, Mexico & Orient at about Crowell, also the St. Louis-San Francisco and the Atchison, Topeka & Santa Fe, with the possibility of passing through Farwell, on the latter road. The main shop will probably be located at Turkey, Tex. Preliminary surveys have been made by Wallace & Noonan, Chicago, and local committees are now being organized to enlist the support of land owners along the line. The section to be traversed by the line is now partially developed but considerably removed from transportation facilities.

The Union Pacific is preparing plans for a $1,000,000 freight station at Denver, Colo., one half of which is contemplated for this year, and has let a contract for the grading for an extension to the present Whittier branch of the Los Angeles & Salt Lake through the towns of Lahabra and Fullerton to Anaheim, Calif. The company has also under consideration extensive harbor improvements in the vicinity of San Pedro, Calif., to be undertaken jointly with the public authorities and has acquired property for a freight classification yard at Los Angeles. The company is also planning to construct this year a substructure of a $1,000,000 bridge across the Columbia river on the Oregon Short Line near Attalia, Wash., and has obtained authority for the construction of a $500,000 tie treating plant at The Dalles, Ore., to replace the existing plant near Wyeth, Ore. The company is also contemplating very considerable improvements to its store department facilities at Pocatello, Idaho, Rawlins, Wyo., and Grand Island and Omaha, Neb.

The Western Pacific has placed an order with the McClintock-Mitchell Company for structural steel for one 210-ft. through-riveted electrically operated draw span, one 100-ft. through-plate girder, and one 80-ft. through-plate girder for the renewal of a bridge crossing the San Joaquin river near Stockton, Calif., this work to be undertaken by company forces during the latter part of July.

The Yazoo & Mississippi Valley, reported in the April issue as accepting bids for the construction of a passenger station at Webb, Miss., has decided to do this work with company forces.

Equipment and Supplies

The Alaskan Engineering Commission has awarded a contract to the United States Steel Products Company for 2,700 tons of steel for the Tenana river bridge.

The Atlantic Coast Line is inquiring for 3,000 tons of tie plates.

The Chicago, Burlington & Quincy has ordered 15,000 tons of rail from the Illinois Steel Company.

The Chicago, Indianapolis & Louisville has ordered 3,000 tons of rail from the Illinois Steel Company.

The Cleveland, Cincinnati, Chicago & St. Louis closed bids May 23 for 3,250 kegs of track bolts.

The Cleveland, Cincinnati, Chicago & St. Louis will close bids June 2, for seven 90-lb. manganese frogs and 151 switch stands with accessories.

The Erie has divided an order for 6,000 kegs of railroad spikes between the Jones & Laughlin Steel Company, Pittsburgh, Pa., and another company.

The Illinois Central has ordered 150 tons of reinforcing bars for grade reduction work at Matteson, Ill., from the Corrugated Bar Company.

The Indianapolis Union is inquiring for 500 tons of 85-lb. rails.

The Kansas City Southern has ordered 6,000 tons of rail from the Illinois Steel Company.

The Japanese Government Railways are inquiring through export houses in New York City for 10,000 tons of 75 lb. rail and for a small quantity of splice bars.

The Lehigh Valley is reported as having ordered about 900 tons of bridge steel from the American Bridge Company; about 800 tons from the Phoenix Bridge Company, and 500 tons from the Bethlehem Steel Bridge Company, for use at various places on its lines.

The Long Island has ordered 2,500 tons of 100-lb. Pennsylvania section rail from the Bethlehem Steel Company.

The Missouri, Kansas & Texas has placed an order for 4,000 kegs of spikes and bolts with the Illinois Steel Company.

The Missouri Pacific has ordered 26 water tanks and standpipes, involving 700 tons of plates and 300 tons of structural shapes, from the Pittsburg-Des Moines Steel Company.

The Mobile & Ohio has ordered 40,000 pairs of angle bars from the Illinois Steel Company.

The New York, Chicago & St. Louis is about to place orders for 30,000 rail joints.

The New York Central has placed orders for 24,800 tons of rail with options on 7,200 tons additional as follows: Inland Steel Company, 2,000 tons, and Illinois Steel Company, 5,400 tons of 105-lb. sections for the New York Central, Lines West, with an option on 2,000 tons additional from the Illinois Steel Company, if taken on or before July 1; Cambria Steel Company, 3,000 tons of 80-lb. sections for the Cincinnati Northern; Carnegie Steel Company, 3,000 tons of 105-lb. sections for the Cleveland, Cincinnati, Chicago & St. Louis; Bethlehem Steel Company, 1,300 tons of 105-lb. sections for the New York Central, Lines East, and to another company, 9,500 tons of 105-lb. sections for the New York Central, Lines East, with an option of 5,200 additional tons to be taken on or before July 1; also to the same company, 600 tons of 90-lb. sections for the Rutland Railroad.

The Pennsylvania has divided an order for 2,000 kegs of railroad spikes between the Jones & Laughlin Steel Company and Dilworth, Porter & Co., Pittsburgh, Pa. The company also ordered 70,000 track bolts from the Oliver Iron & Steel Co., Pittsburgh.

The Pere Marquette has ordered 3,500 tons of steel rail from the Inland Steel Company.

The Philadelphia & Reading has ordered 500 tons of bridge steel from the American Bridge Company for a bridge over the Schuylkill river at Norristown, Pa.

The St. Louis-San Francisco has placed an order with the Wisconsin Bridge Company for four deck girder spans totaling 123 tons of structural steel.

The Southern Railway has ordered 300 tons of bridge steel from the Virginia Bridge & Iron Company for use on a bridge over the Holston river.

The Southern Pacific is inquiring for 20,000 kegs of spikes and bolts.

The Terminal Railroad Association of St. Louis has ordered 800 tons of steel rails from the Illinois Steel Company.

The Texas & Pacific has ordered three 100-ton turn-tables from the American Bridge Company.

The Toledo, St. Louis & Western has ordered 4,000 tons of rails from the Carnegie Steel Company, and has an additional 1,000-ton inquiry pending.

Supply Trade News

Personal

Frank B. Stone has removed his office from the Railway Exchange building, to 1620 Mallers' building, Chicago.

W. B. Mallette has been appointed agent of the **Track Specialties Company,** New York, with office at 3883 Wyoming street, St. Louis, Mo.

Leslie G. Lamborn has been appointed manager of the Sheet Metal and Wire Works division of the **Parker Rust-Proof Company,** Detroit, Mich.

W. F. Robinson, assistant sales manager of the **Edward Hines Yellow Pine Trustees,** Lumberton, Miss., has been promoted to general sales manager, effective May 1.

W. H. Saunders, district sales representative of the **National Cast Iron Pipe Company,** with headquarters at Dallas, Tex., has been transferred to Kansas City, Mo. He will be succeeded at Dallas by **B. L. Hendershot.**

Philip L. Moury, for many years manager of sales of the railroad department of the Sherwin-Williams Company, with headquarters at Cleveland, Ohio, has become associated with the Detroit Graphite Company as vice-president, with headquarters at Detroit, in which capacity he will have entire charge of the railway department.

A. R. Ludlow, vice-president of the Air Reduction Company, Inc., New York, was elected first vice-president at a meeting of the board of direction on May 24. M. W. Randall, secretary, was elected vice-president and secretary; Herman Van Fleet, chief engineer, was elected vice-president and operating manager, and Dr. F. J. Metzger was elected vice-president in charge of research and development.

A. W. Bowie and **J. J. Lydon,** who have been connected with the Westinghouse, Church, Kerr & Company, and their successors, Dwight P. Robinson & Co., for the past 25 years, recently resigned from that organization and have organized **Bowie, Lyden & Co., Inc.,** to handle industrial and railroad construction, with offices at 340 West Harrison street, Chicago. W. G. Bierd, president of the Chicago & Alton, has been elected president of the company, and M. P. Tilley, formerly with Westinghouse, Church, Kerr & Co. and more recently the Lystbader Construction Company, has been added to the above staff.

General

The Chicago Bridge & Iron Works has removed its Chicago office from the Old Colony building to the Transportation building.

The Lundie Engineering Corporation has moved its Chicago office from 30 North LaSalle street, to 166 West Jackson boulevard.

The Illinois Zinc Company, Peru, Ill., has opened a sales office in the McCormick building, 332 So. Michigan avenue, Chicago. The company also has sales offices at 280 Broadway, New York City, and 1331 Filbert street, Philadelphia, Pa. The smelters and rolling mills are located at Peru.

The Decatur Bridge Company, Decatur, Ill., and the **Christopher & Simpson Iron Works Company,** St. Louis, Mo., have been merged into the newly organized **Mississippi Valley Structural Steel Company** of which W. M. Wood is president, D. A. Caldwell, E. B. Tyler, R. B. Wood and W. F. Simpson, Jr., are vice-presidents; C. R. Dick, secretary, and E. T. Brown, treasurer. The company has an annual capacity of 40,000 tons and has established sales offices at Chicago, St. Louis and Kansas City, Mo.; New Orleans, La.; Sioux City, Ia., and Decatur, Ill.

The Bucyrus Company, South Milwaukee, Wis., has under way extensive enlargements to its plants at South Milwaukee and at Evansville, Ind. In the South Milwaukee plant, where all the larger machinery is built, a new gray iron foundry is now under construction, 276 ft. in length. The old gray foundry is being converted into a cleaning room with annealing ovens, sand blast rooms and a welding room. A large addition is also being made to the steel foundry molding floor, and an electric furnace is being installed. At the Evansville plant, which specializes in the manufacture of small revolving shovels, the machine and erecting shops are being considerably enlarged.

Dwight P. Robinson & Co., New York, has been given a contract for the construction of a building to accommodate American commercial exhibits at the Brazilian Centennial Exposition to be held in Rio de Janeiro beginning September 7. The building, which will be the unofficial exhibit building, will be constructed of American materials as far as possible. It will be purely a commercial proposition, having no direct connection with the exhibition plans for the American government under the appropriation of $1,000,000 made by Congress recently.

Bethlehem-Lackawanna Merger

It was announced after the meeting of the Board of directors of the Bethlehem Steel Corporation on May 16 that the directors had unanimously approved all terms and conditions agreed to in respect to the purchase of the properties and assets of the Lackawanna Steel Company, and had taken the necessary steps for placing the matter before the stockholders for their consideration.

The purchase price agreed to be paid by Bethlehem is an aggregate par amount of its seven per cent preferred stock and class B common stock equal to the par amount of the stock of Lackawanna outstanding ($35,108,500), consisting of 40 per cent in the seven per cent preferred stock and 60 per cent in the class B common stock of Bethlehem, with an option in Bethlehem to reduce the par amount of the preferred stock and increase the par amount of the class B common stock thus to be delivered by $1,543,400 upon payment of approximately $300,000 in cash. Bethlehem is also to assume the debts and obligations of the Lackawanna.

Although the transaction takes the form of the outright purchase of the Lackawanna properties, the Bethlehem Company announces that Mr. Taylor and other important interests associated with him in the control of the Lackawanna Company will become closely associated with the direction of the consolidated properties and it is expected that they will be liberally represented on the Bethlehem board.

Trade Publications

Track Jacks.—The Templeton, Kenly & Co., Ltd., Chicago, has recently issued a 24-page booklet describing and illustrating its Simplex jacks.

Storing and Seasoning Ties.—Bulletin No. 20 has recently been issued by the Century Wood Preserving Company, Pittsburgh, Pa., on the reasons for and the proper methods of storing and seasoning cross-ties. The greater portion of the book consists of reading matter in which all phases of the storing and season question are discussed, leaving the remainder of the book for illustrations of tie storage yards. The bulletin has 16 pages.

Outspinning the Spider.—An interesting book of 137 pages, illustrated, has recently been issued by John A. Roebling's Sons Company, Trenton, N. J., in which the history of wire is traced from its development. The story is told in a smooth, easy-reading, non-technical manner, beginning at the time of the first wire cable built by the founder of the company, and extending up through the increasing uses for such products and the building of suspension bridges, to the manufacturing process of making all forms of modern finished wire, from furnace to shipping room.

Welding Rods and Electrodes.—A 40-page handbook known as Catalog No. 500, has recently been issued by the Page Steel & Wire Company, Bridgeport, Conn., which gives a variety of information concerning Page-Armco welding rods and electrodes for oxy-acetylene and electric welding. The catalog is well illustrated and in addition to the welding rod data, it contains a fund of miscellaneous information useful to the welder concerning the metallurgy of iron and steel, the amount of welding material required per lineal foot of weld, the definitions of electrical units, mensuration factors, wire gage table, etc.

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PITTSBURGH: The New Jersey Zinc Co. (of Pa.), 1439 Oliver Building.
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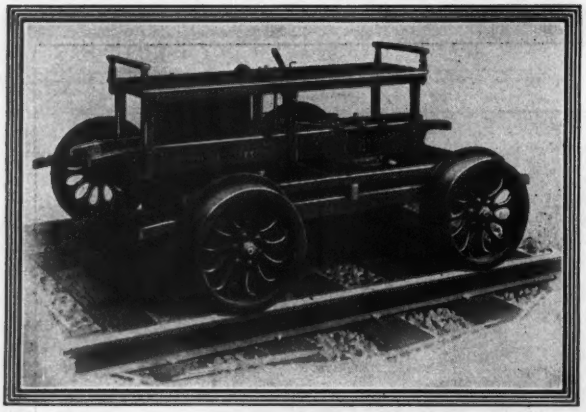

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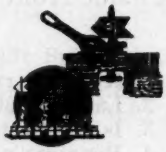

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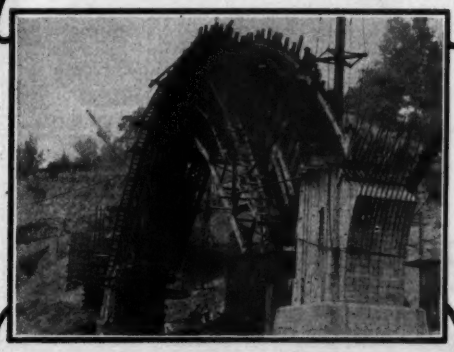

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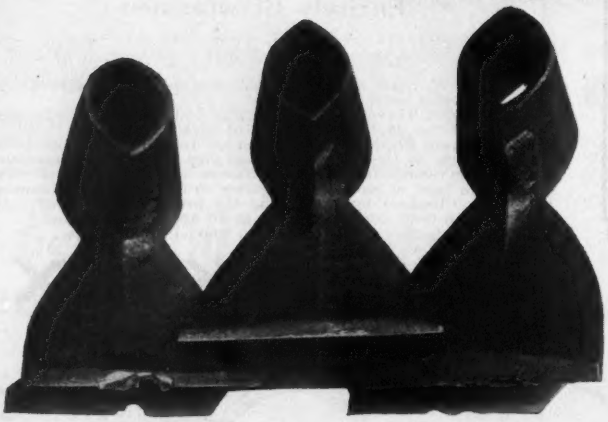

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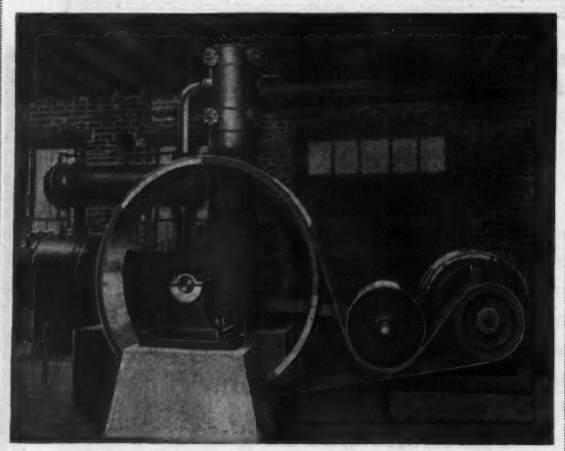

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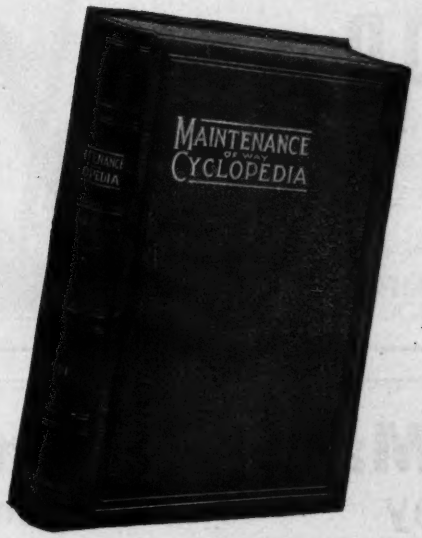

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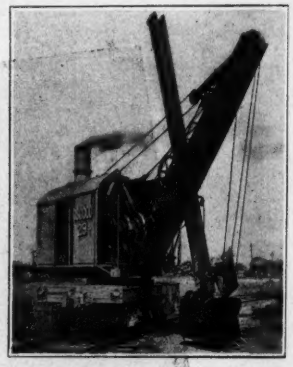

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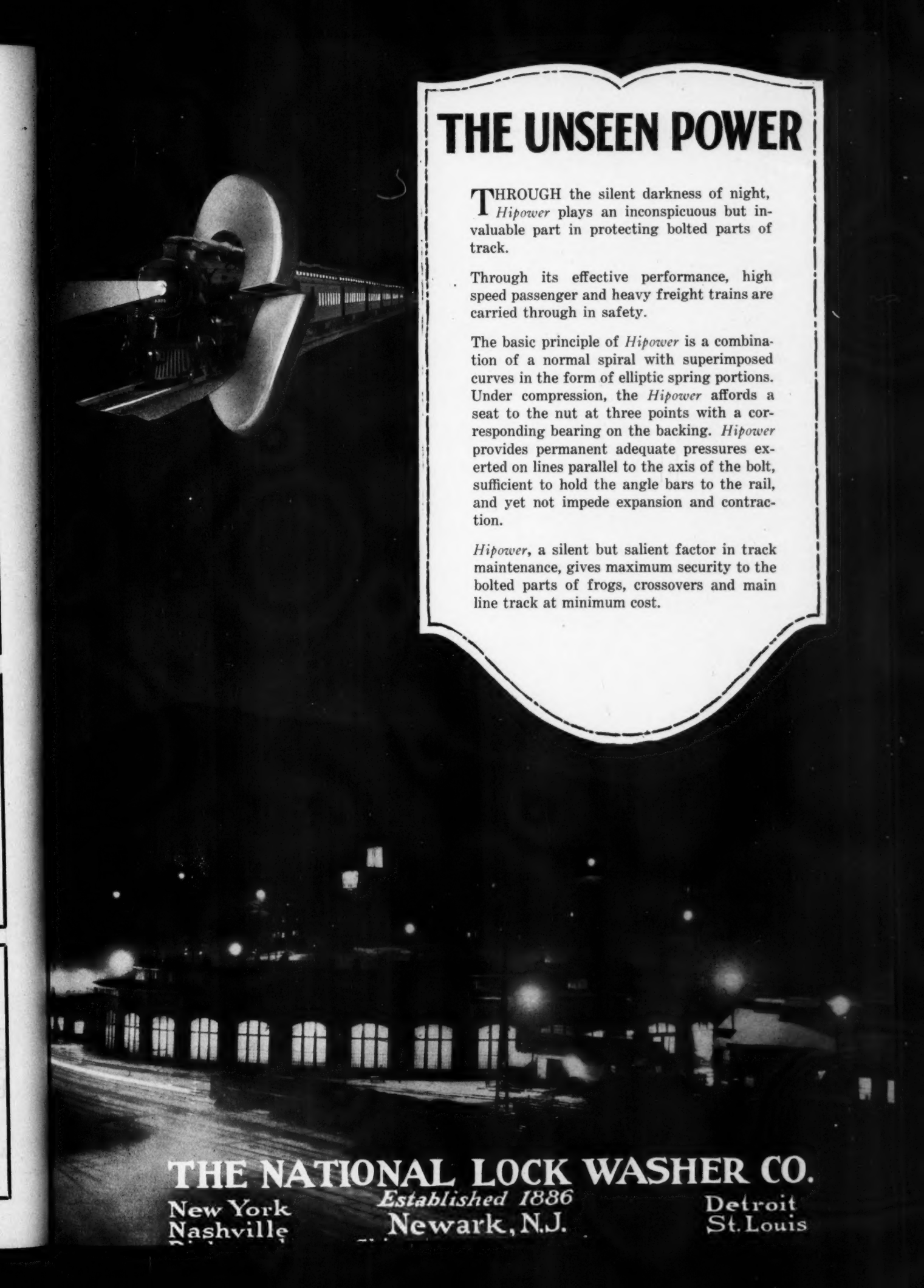

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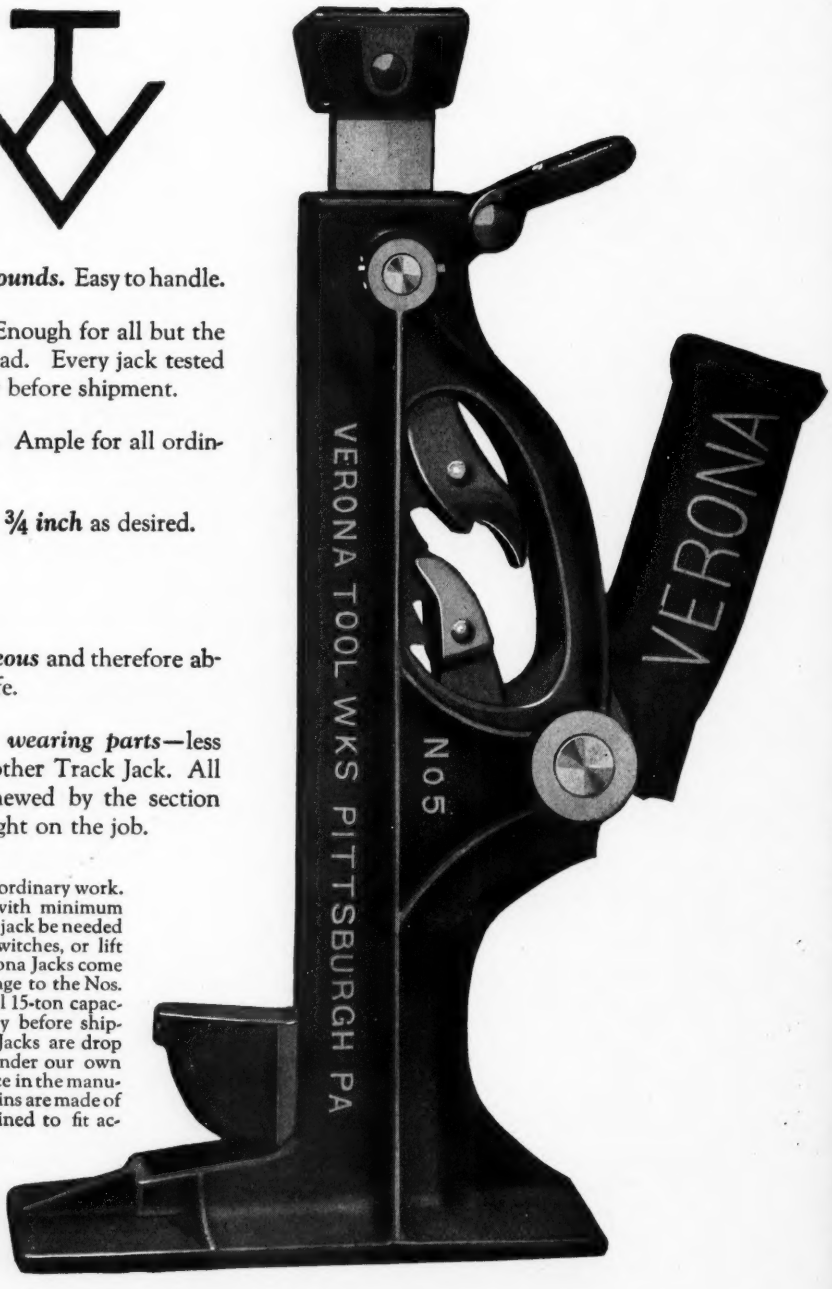

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